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Impact of religious participation, social interactions and globalisation on meat consumption: evidence from India

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Abstract

From both health and environmental policy perspectives, it is advisable to ensure that individuals maximise the nutritional gains from eating meat, without having a significantly adverse environmental impact, i.e. sustainable meat consumption pathways are imperative. This is especially true for developing countries, where rising incomes and growing populations have meant that meat consumption has also risen. India is an example of a country where a large share of the population has been vegetarian due to religious and cultural factors, although this is rapidly changing. In this paper, we hypothesise that social interactions and globalisation are two factors that explain this shift in consumption behaviour, especially amongst Hindu households. These hypotheses are based on the theoretical findings of Levy and Razin (2012). The empirical results show that Hindus that are members of religious groups are less likely to eat meat than non-member Hindus, whereas Hindus that are members of non-religious types of groups are more likely to eat meat than non-members. We also find that Hindu households that frequently use sources of media such as newspapers, the radio or television are more likely to consume meat compared to Hindus that do not. This paper provides important policy implications, both in terms of the formulation of Nationally Recommended Diets in developing countries, and in terms of identifying the channel of influence of both social networks and globalisation on social and religious norms, consumption behaviour, and ultimately, on climate change.

Keywords: Meat consumption; Religious norms; Social interactions; Globalisation; India

JEL Codes: D83; Q18; Q54; C23;C26

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1 Introduction

Increased meat consumption in developing countries is related to the process of globalisation and economic development, and yet is still a culturally-rooted habit that has important consequences for both human health and on the environment. While meat has traditionally been seen as a critical driver of protein consumption in nutrition and dietetics, recent studies have also highlighted the increase of health risks due to high levels of meat consumption, especially red meat (WHO, 2015). Environmentally speaking, meat consumption has been known to have negative effects on the atmosphere and climate, land use and on water scarcity (FAO 2006; Revell 2015). The production of livestock products, especially ruminant meat, is resource-intensive; livestock emissions account for almost 44% of total anthropogenic emissions of methane, and 53% of total anthropogenic emissions of nitrous oxide, both gases known to have high GWP (global warming potential). From both health and environmental policy perspectives, it is thus advisable to ensure that individuals maximise the nutritional gains from eating meat, without having significantly adverse environmental impacts, i.e. sustainable meat consumption pathways become imperative.

It has been estimated that economic and population growth will lead to a 21% increase in per capita meat consumption by 2050 in the world, and an increase in total meat consumption and in greenhouse gas (GHG) emissions by 63%, compared to the levels in 2010, with much of this increase occurring in developing countries such as China and Brazil (Revell, 2015).[1]

This negative externality is more glaring in the context of the predicted environmental impact of Nationally Recommended Diets (NRDs) in lower middle-income countries, primarily driven by the increase in the consumption of animal products that is advocated

[1] The demand for meat is rapidly increasing with income in developing countries; under some scenarios, per capita meat consumption is predicted to increase from 2010 to 2050 in the regions of Africa, Asia, and Central and South America, while it is predicted to decline in North America, Europe and Oceania (Revell, 2015).

by their governments for nutritional reasons.[2] Recent research by Behrens et al. (2017) suggests that animal products such as meat, fish and dairy account for almost 22% of the emissions from the diet in lower-middle income countries. They also find that in countries such as India and Indonesia, switching to a NRD from the current average diet is expected to increase GHG emissions by 17%, increase the impact from eutrophication by 32%, and also increase the negative environmental impact from land use by 14.8%.

India is a special country to study meat consumption: it is known to have one of the highest number of vegetarians of any country in the world (about 50%, according to the India Human Development Survey (IHDS) (Desai et al. 2010; Desai et al. 2015). Religion has been a major source of vegetarianism in India, with many subgroups such as Hindus, Buddhists and Jains still being largely vegetarian. Hinduism and Buddhism largely recommend vegetarianism, whereas Jainism mandates it. However, the meat consumption habits of people depend considerably not only on religion, but also on geography, caste and on culture. The large fraction of vegetarians in the country can be directly linked to the large share of Hindus in the population, and its associated traditions and customs, although this is fast changing. This has potentially massive effects on climate change, given India's projected increases in population.

An increase in meat consumption may reflect two things: one, it may simply be a result of improving economic conditions in a developing country, whereby diet diversification may be an outcome of higher incomes. On the other hand, it is at least partially a reflection of a trend whereby many Indians are being influenced by globalisation and shifting social norms, and consequently possibly diluting their adherence to religious rules. All in all, this has clear implications on meat consumption in the coming decades, especially that of chicken and mutton, which are the most popular forms of meat consumed in India.

Our objective in this paper is to shed some light on potential determinants of meat consumption amongst Hindus in India. We hypothesise that the forces of social interac-

[2] Given rampant malnourishment in developing countries, NRDs often recommend higher meat consumption, without necessarily adopting an environmentally sustainable viewpoint.

tions, as well as exposure to other lifestyles, may have played a role in influencing the decision of Hindu households to eat meat. In order to do this, our approach is to rely on the findings of Levy and Razin (2012), who in their paper develop a theoretical model linking religious beliefs, religious practice and social behaviour; they suggest that social interactions between individuals may play a role in determining their religious participation, or adherence to rituals. Our hypothesis is that Hindus that actively participate in social networks or are members of groups (and thus, are likely to have more interactions with other households, either Hindu or non-Hindu) are likely to be influenced in their meat consumption decisions by these interactions. Levy and Razin (2012) also find that external shocks such as globalisation may induce individuals to alter their religious beliefs, and thus practices: in line with their findings, we hypothesise that Hindu households with access to sources of media (i.e. Hindus that are likely to be more exposed to western traditions and beliefs) are more likely to consume meat. We thus interpret globalisation as enhanced exposure to western culture and lifestyles.

We use data from the India Household Development Survey (IHDS) for the analysis, which is a two-wave dataset that provides rich household-level information on consumption expenditure along with socio-economic characteristics. We adopt a transparent empirical approach, where we first investigate the effect of religion on the choice to consume meat in India; we find that Hindu households are less likely to consume meat than households belonging to other religions for whom no restrictions are imposed, or vegetarianism is not condoned.

In line with our hypotheses regarding the effects of social interactions and globalisation on meat consumption behaviour, we estimate the effects of membership in religious groups, in non-religious groups, and frequent use of media on the decision of Hindu households to purchase meat. In the baseline model of the paper, we find that Hindus that are members of non-religious groups are more likely to consume meat compared to Hindus that are not members of such groups, while Hindus belonging to religious groups are less likely to eat meat than other Hindus. We also find that Hindus that frequently

listened to the radio, read newspapers, and watched television, or owned at least one electronic communication device (such as a telephone, cellphone, television or computer) are more likely to consume meat than those that do not have access to these sources of media.

Policy implications of this paper are related to the formulation of national nutritional norms and NRDs that ensure that individuals maximise their nutritional gains, while also minimising the adverse environmental impact of meat production, as has been advocated both in recent scientific studies, as well as in media outlets (Springmann et al. 2018; Achenbach 2018). It is critical for policy-makers to consider how it may benefit the environment to advocate sustainable meat consumption, or even suggest non-meat based forms of protein as alternatives. This is of particular relevance in developing countries, where the population may be expected to increase fairly consistently in the coming years, and not only are more households likely to eat meat, but per capita meat consumption may also increase.

The structure of the paper is as follows: Section 2 provides a background on religion and meat consumption habits in India, and develops hypotheses based on literature in religion and its influence on social interactions, Section 3 provides details on the data and methodology used for the analysis, Section 4 includes the main results of the paper, while Section 5 concludes and includes policy implications. The appendix includes additional tables.

2 Background and Hypotheses

In this section, we present a background on Hinduism and meat consumption in India, and then we develop testable hypotheses, based on a nascent literature on religious participation, rituals and social interactions.

2.1 Background

The role of religion in explaining economic attitudes has been studied previously. For instance, Renneboog and Spaenjers (2012) find that religious households consider themselves more trusting, have a longer planning horizon, and also save more. Studies also find that consumption decisions (such as meat consumption) are driven by culture and country-specific norms, and can be influenced by several factors such as geography, cultural beliefs, religion, gender, and other forms of socio-economic differences (Kearney 2010; Wang et al. 2010). However, there is minimal literature on the socio-economic determinants of meat consumption at the national level, a decision that has important repercussions for private health, as well as for the design of nutrition and environmental policy (Latvala et al., 2012).

The history of vegetarianism in India is deeply rooted in culture and traditions, especially Hindu customs. Hinduism is the dominant religion in India, followed by almost 80% of individuals (Desai et al. 2010; Desai et al. 2015). In ancient India, Hindu religious groups and philosophers vigorously encouraged the idea of nonviolence (or Ahimsa) towards all beings, which gave rise to a largely vegetarian diet (Hinduism Today, 1996). Several early religious texts and scriptures have commented on meat consumption, with many extolling the virtues of vegetarianism, while a few have also suggested that meat consumption may also be allowed on certain occasions, largely for religious ceremonies or as sacrifices (Alsdorf and Bollée, 2010). Table 5 in the Appendix includes examples of both types of scriptures from Hindu texts.

While there has always been a lot of variation in the practice of vegetarianism amongst Hindus, largely driven by differences in geography, caste, and even culture, the idea that vegetarianism was integral for achieving positive health, which was vital for spiritual progress, has been passed down generations, even though Hinduism does not explicitly ban meat consumption (except beef, as cows are sacred for Hindus). While many Hindus have eaten meat in the past, and still continue to do so, there is a strong vegetarian

tradition in Hinduism (Davidson, 2003a). Eating meat is recognised as a choice for Hindus, but religious and cultural norms have meant that in contemporary Indian society, an overwhelming number of Hindus remain vegetarian (Kemmerer, 2011).

Buddhism and Jainism are other religions followed in India that have supported vegetarianism amongst their followers as a way of life, however they differ in their obligation to do so. Buddhism, much like Hinduism, does not explicitly ban meat consumption, but recommends it. Jainism, on the other hand, explicitly bans meat consumption in all forms (these religions are followed by a smaller fraction of the population, compared to others in India). Table 5 also includes scriptures from these religions that promulgate vegetarianism. The other religions followed by Indians do not insist on vegetarianism among their followers. Eating meat, or abstaining from it, is the individual's choice according to these religions. While Islam, the second most popular religion in India, prohibits only pork consumption, Sikhism and Christianity do not impose restrictions (except that Sikhs should consume "Jhatka meat", which is meat from an animal that is killed quickly and with minimal suffering).

Of course, a part of the increase in meat consumption in developing countries like India over time may be attributed to the increase of household incomes. Several studies on income-induced diet diversification suggest that consumers switch to a more varied and balanced diet with an increase in income. Vranken et al. (2014), for instance, show that there is an inverse U-shaped relationship between meat consumption and income, suggesting that at with initial increases in income, meat consumption increases, but beyond a certain income, average meat consumption may flatten out, or even start to decline.

Kearney (2010) finds that between 1963 and 2003, developed countries witnessed an increase in vegetable oil consumption, while in developing countries, calories from the consumption of meat have increased over time, along with those from sugar and vegetable oils. Meat consumption increased drastically during this period in developing countries, especially in countries such as China (where it increased nine times), and in Brazil (where it increased three times) since 1963. While this evolution in the diets of low and middle-

income households has positive implications from a public health perspective, especially due to the adoption of a more varied protein-rich diet (Pingali and Khwaja, 2004), it has negative implications for the climate. Therefore, for developing and emerging countries, the challenge is to identify meat consumption pathways that are sustainable, and ensure that while protein intake requirements are met, emissions from meat production are also minimised.

In this paper, we argue that at least a part of the choice to eat meat for Hindus in India may be explained by social interactions and exposure to global lifestyles, and how these may have led to a gradual weakening of religious practice. Religion and culture have an impact on food consumption behaviour in general, and meat consumption in particular (Kearney, 2010). Even when income differences between countries disappear, consumption behaviour is unlikely to homogenize, due to cultural differences (De Mooij and Hofstede, 2002).

A priori, the effects of these forces may work in both directions: they may strengthen existing religious practice, but they may also trigger the dilution of religious norms, as individuals begin to adopt "globalised" beliefs. A strand of the sociological literature identifies the adoption of western values and lifestyle as a means to integrate with the global community. This implies the gradual erosion of local or native ideologies, and is often accompanied by changes in consumption patterns in developing countries (Ritzer, 2008), also known as "McDonaldization". This literature pinpoints the role for media sources such as television, and access to the internet in facilitating these changes.

Another means for individuals to alter their existing religious practice is through social interactions, or "social capital". Putnam (1993) found that social capital, measured in terms of membership in formal groups, may act as a determinant of economic and government performance. Additional literature has found a role for social learning in influencing consumption decisions, when ex-ante quality is uncertain (Moretti, 2011); in influencing a household's level and share of expenditure on visible consumption (Roth, 2014); and when both the visibility of consumption decisions and word-of-mouth matter (Bollinger

and Gillingham, 2012).

As with globalisation, deeper social ties may either strengthen or weaken households' existing religious adherence. For instance, membership in groups or networks that are religious in nature is more likely to lead to stronger adherence to religious rules and practices. Iannaccone (1992) developed a model that explains adherence to dietary restrictions by the cost of participating in them. According to this framework, these rules are a (costly) screening mechanism, in order to mitigate free-rider problems with collective action. They help religious groups to identify individuals that are likely to participate more intensively in religious activities, and as he finds, membership in religious groups is also welfare-enhancing for these individuals. On the other hand, households that are members of other forms of groups (that are not religious in nature) are likely to interact with a heterogeneous set of households, which may dilute their religious practice.

2.2 Hypotheses

India is known to have a long tradition of lacto-vegetarianism, and also has one of the largest vegetarian populations in absolute terms. As has already been highlighted, this is largely driven by religious or cultural norms especially followed by Hindus, Buddhists and Jains, along with their religious beliefs. This leads to our first hypothesis.

Hypothesis 1: Hindu, Buddhist and Jain households are less likely to eat meat than households affiliating themselves to other religions in India.

Levy and Razin (2012) provide a useful theoretical framework assimilating religious beliefs, religious practice and social interactions among individuals. In their model, religion serves to instil certain beliefs in individuals. Its description of rewards and punishment often dictate behaviour in the social sphere. Affiliation to a religion involves two things: not only does it endow one with beliefs, but it also involves participation in a costly behaviour, or religious "ritual" or practice (which is observable, such as not eating meat in Hinduism).

Individuals have the opportunity to either cooperate, or defect, during their social interactions with one another. Individuals that participate in (costly) rituals (the religious) see a statistical correlation between their actions in the social interaction, and the risk of reward or punishment. Thus, while some religious individuals may defect, they are more likely to cooperate in the social interactions. Seculars, on the other hand, see no such correlation, and thus always prefer to defect in social interactions.

Thus, social interactions may act as a stimulus to keep religious Hindus from eating meat, or meat-eating Hindus from switching to vegetarianism, depending on what kind of groups they interact with each other in, and what cooperation or defection means in the context of membership in that group. For instance, in a Hindu religious organisation, most members are likely to not eat meat. A Hindu household that is a member of such an organisation is likely then to "cooperate" by not eating meat, as it is more likely to encounter other Hindu households that do not eat meat. On the other hand, in the context of a non-religious group, a Hindu household is more likely to interact with other households that eat meat (possibly due to membership of non-Hindus, or other Hindus who may eat meat), and thus they are more likely to "cooperate" in eating meat.

These theoretical findings are, at least partially, confirmed by other studies: Huber (2005), for instance, argues that the association between religious belief and religious practice is highest in countries that are rich, that have strong legal systems, that are ex-communist, are not corrupt, and that have high levels of religious pluralism, while less developed countries are characterised by strong network effects for religious members.

In similar work, Levy and Razin (2014) highlight that there are two types of religions: ritual-based, and discipline-based. Ritual-based religions are characterised by the fact that all those that participate undertake costly rituals, which is one reason why individuals are more likely to cooperate with one another in social interactions. Discipline-based religions, on the other hand, involve the monitoring of past behaviour in determining the appropriate action of individuals in social interactions.

Once individuals are sufficiently informed about social behaviour (through the types of

channels we suggest, such as social interaction, or access to forms of media, for instance) communities may begin switching from a ritual-based religion to a discipline-based one, where rituals are abandoned, especially by individuals with weak beliefs (Levy and Razin, 2014). This supports our hypothesis that Hindus that are more exposed to global lifestyles may partially abandon their religious practices.

Hypothesis 2: Hindu households that interact with other households through groups or networks of a non-religious nature are more likely to eat meat than non-member Hindu households. Hindu households that are members of religious groups are less likely to eat meat than non-member Hindu households.

Alluding to the framework of Levy and Razin (2012), globalisation can be defined as an exogenous positive utility "shock". Globalisation in India has been a pivotal force in the transformation of religion, and in instigating the gradual erosion (or mutation) or prior belief systems and religious practices (Radhakrishnan, 2004).

According to their model, in the presence of positive utility shocks, beliefs of agents increasingly become polarised, as they re-evaluate their probability of receiving a negative shock: this translates into individuals that were previously cooperating (i.e. those that perceived the negative shock as more likely) becoming even more likely to do so, and vice-versa. However, the pivotal agents in this case are those that previously had intermediate probabilities of receiving a negative shock: Levy and Razin (2012) show that with positive utility shocks, these agents who previously interacted with seculars (and thus defected) are more likely to lose faith entirely (by beginning to eat meat, amongst Hindus, for instance). Thus, in the midst of forces such as globalisation, the size of the religion may be expected to shrink. This leads to our third hypothesis.

Hypothesis 3: Hindu households that are more exposed to global lifestyles (through access and use of media), are more likely to eat meat than other Hindu households.

3 Data and Methodology

3.1 Data

The data for this study is drawn from the India Human Development Survey (IHDS), prepared by the University of Maryland, in collaboration with the National Council for Applied Economic Research (NCAER) in India (Desai et al. 2010; Desai et al. 2015). This is a large-scale survey on a representative sample of households across Indian states and union territories, and spans two rounds (2005-06 and 2011-12). About 83% of households that are sampled in the first round of the survey are retained in the sample in the second round, constituting a panel of 40,018 households. The survey collects extensive information on socio-economic characteristics of households and the individual members, and on the consumption profile of households (in the previous 30 days prior to the date of survey).

Our dependent variable is a dummy variable indicating whether a household purchased a positive quantity of meat in the last 30 days prior to the date of the survey, or not.[3] This measure clubs together consumption of different kinds of meat, such as chicken, mutton, beef, pork and also fish.

In order to test hypothesis 1 regarding the role of religious affiliation on meat consumption, we extract information from the IHDS on the religion of the households. The main religions that we are able to identify are Hindus, Muslims, Christians, Sikhs, Buddhists, Jains, Tribals, and those that belong to other denominations, or do not ascribe to any religion. Since the emphasis of our paper is on the meat consumption behaviour of Hindus, we restrict the sample to the Hindu sub-population (which comprises 80% of the total sample) for testing hypotheses 2 and 3 in the main results.

The second set of explanatory variables relate to group membership of these house-

[3] In this paper, we make the assumption that households that did not purchase meat in the last 30 days are vegetarian. Of course we cannot exclude the possibility that some households may have purchased meat before that (in the last 2-3 months, for instance), however in this case, we assume that these households can also be considered vegetarian.

holds. We have household-level information on membership in religious groups, and in women's groups, youth and sports organisations, unions or business groups, self-help groups, credit and savings organisations, caste associations, development groups or NGOs, and agricultural or cooperative groups. In order to test our hypotheses, we segregate group membership along the religion dimension, thereby creating two dummies, one for membership in religious groups, and the second for membership in all other kinds of groups (or what we term "non-religious groups").

Lastly, we have information on the access to media for households, or their exposure to globalisation. We construct two measures: one aims to capture what forms of devices of communication the household owns. It is created as a dummy variable for whether a household owns a telephone, cellphone, television or computer. The second measure is a dummy variable that captures whether the adult men or adult women in the household frequently (or somewhat frequently) use television, radio or newspapers. It aims to capture the households' intensity of exposure to media.[4]

Table 1 below presents a description of the composition of the sample, in terms of the relevant explanatory variables, by year. This information suggests that a large fraction of the population was Hindu (about 82% in both years). Muslims, Christians and Sikhs are the next largest shares of the population. Some households change their religion over time, even though the number is marginal proportional to the total number of households in the sample (about 3.5% of households). We can also see that religion (and interactions with other households of the same, or different religion through groups of a non-religious nature) might be an important channel for transmission of information on consumption habits (especially given that almost 36% of households are members of groups of a non-religious nature in 2011-12).

Table 1 also includes some statistics on the proportion of households with adult men

[4] We also have information on the frequency of access to these sources of media for the children in the household, but we do not use this in creating the measure of access to media, as it is unlikely that children are the decision-makers in terms of household-level food consumption.

and women that use sources of media such as television, radio and newspapers on a frequent (or somewhat frequent) basis. We find that the proportion of households listening to the radio has declined over time, whereas the number of households watching television frequently has increased from about 73% in 2005-06 to 81% in 2011-12. Newspaper readership remains at about 50% in both time periods. The share of households that owned a telecommunication device also increased to 83% by 2011 (for instance, about 7% of households owned a cellphone in 2005-06, whereas this number increases to about 79% by 2011, suggesting a channel for an increase in exposure of households over this time frame, both through social interactions, and possibly to sources of globalisation through increased internet access).

Table 2 below reports the summary statistics for the control variables that are included in the estimations, along with the dependent variable (namely, whether a household purchased a positive quantity of meat in the previous 30 days). In 2005, about 44% of households consumed meat across all religions, whereas in 2011, this proportion is 45%, which implies that the proportion of vegetarians remained almost constant over the two periods. The average quantity of meat purchased in the last 30 days marginally increased from about 1.09 kgs in 2005-06 to about 1.18 kgs in 2011-12.[5]

From Table 2, we see that almost 40% of Hindus ate meat in both time periods. On average, Indian households have reduced in size over time, from 5.85 members to 4.87 members in 2011-12. The levels of education of both men and women in the sample have increased over time. Additionally, about 30% of the sample comprises urban households, whereas 70% is rural, in both years of the survey. We see that the average annual income of the Indian household has increased over the time period. We also see that the prices of meat and lentils, the major sources of protein in the Indian diet, have increased over time in our sample, although a priori, we do not assume that these are either substitutes

[5] The quantity of meat purchased is capped at 10 kilograms per month in the regressions, to exclude outlier observations. This excludes only about 2% of the observations from our sample. Further, we should be aware that the quantity measure might be unreliable because of reporting discrepancies and recall errors.

Table 1: Proportion of Households by Religion in 2005-06 and 2011-12

Proportion of HH by religion	2005-06		2011-12	
	Obs	Proportion	Obs	Proportion
Hindus	32475	0.81	32714	0.82
Muslims	4614	0.12	4647	0.12
Christians	1119	0.03	1140	0.03
Sikhs	1031	0.03	933	0.02
Buddhists	260	0.01	247	0.01
Jains	103	0.00	99	0.00
Tribals	395	0.01	192	0.00
Others	19	0.00	35	0.00
None	2	0.00	10	0.00
Total Obs.	40018		40017	
Membership in different groups and networks	2005-06		2011-12	
	Obs	Proportion	Obs	Proportion
Religious and social groups	39962	0.145	39960	0.114
Women's groups	39948	0.076	39963	0.091
Youth/sports organisation, reading group	39964	0.051	39959	0.028
Unions/business or professional groups	39962	0.046	39955	0.050
Self-help groups	39963	0.098	39962	0.190
Credit and savings organisations	39956	0.072	39961	0.107
Caste associations	39957	0.131	39959	0.084
Development groups/NGOs	39953	0.017	39956	0.013
Agricultural groups/ cooperatives	39934	0.038	39957	0.031
At least one non-religious group	40018	0.318	40018	0.359
Frequent use of media	2005-06		2011-12	
	Obs	Proportion	Obs	Proportion
Radio	39478	0.498	39741	0.268
Newspaper	39361	0.494	39756	0.527
Television	39410	0.726	39766	0.808
Whether HH owns a device	40018	0.531	40018	0.832

of complements.[6] Lastly, we also find that many households in our sample do not own a refrigerator, even though rates of ownership have increased over time. This may be a deterrent towards higher consumption of meat in India.

3.2 Methodology

3.3 Methodology

Our methodological approach in this paper is to build our story step-by-step, by using different model specifications to see whether our hypotheses are valid. Regarding the choice of econometric model, we need to take into account that our dependent variable is dichotomous.[7] Therefore, for the econometric analysis, we could either use a Probit/Logit model or a linear probability model (LPM). In our estimations, we decide to use a LPM because, as we discuss later on, in the presence of econometric issues such as endogeneity

Table 2: Summary Statistics of Modelling Variables: 2005-06 and 2011-12

Variables	2005-06			2011-12		
	Mean	Std.Dev.	Obs	Mean	Std. Dev.	Obs
Whether HH consumed a positive quantity of meat in the last 30 days	0.437	0.496	29757	0.449	0.497	22398
Quantity of meat purchased in the last 30 days (in kgs)	1.459	3.125	29757	1.545	3.100	22398
Logarithm of annual HH income (in Rupees)	10.404	1.017	39363	11.196	1.059	39416
Highest level of education of adult men (0= none, 3 = graduate)	0.898	0.574	38164	1.005	0.688	36958
Highest level of education of adult women (0= none, 3 = graduate)	0.586	0.601	39459	0.735	0.698	39362
Number of members in HH	5.848	3.029	40018	4.868	2.341	40018
State-level unit value of meat (Rs. per kg)	80.22	17.78	40018	143.89	32.95	40018
State-level unit value of lentils (Rs. per kg)	28.69	4.15	40018	60.87	7.30	40018
Whether HH lives in an urban area	0.295	0.456	40018	0.318	0.466	40018
Whether HH owns a refrigerator	0.157	0.364	39902	0.266	0.442	39995

[6] In order to create the price variables, we have taken state-wide average across all households of the unit value of each commodity, obtained by dividing total expenditure on them by the total quantity purchased. Thus, this variable is populated even for households that did not purchase these food items.

[7] Our main interest in this paper lies in the estimation of the effects of social interactions and globalisation on the decision of households to consume meat, and not on the quantity of meat that they consume. Moreover, the question in the survey asks households for the quantity of meat purchased by the household in the previous 30 days prior to the date of the interview. Evidence suggests that households in interview-based surveys may suffer from recall error. Measurement error in recall data, especially on food expenditure, has been found to be substantial (Brzozowski et al. 2017; Moltedo et al. 2014). This is another reason we choose to focus on the decision to consume meat, rather than the quantity itself.

and unobserved heterogeneity, the LPM is more tractable (Angrist and Pischke, 2009).[8]

In order to test Hypothesis 1, we first estimate the following pooled linear probability model (LPM):

$$M_{i,T} = \alpha_0 + H_{i,T}\alpha_1 + B_{i,T}\alpha_2 + J_{i,T}\alpha_3 + \boldsymbol{X_{i,T}}\beta + \mu_{i,T} \tag{1}$$

where $M_{i,T}$ denotes whether household i purchased meat (or not) in a positive quantity, $H_{i,T}$ is a dummy indicating whether household i is Hindu in period t, $B_{i,T}$ is a dummy which indicates whether household i is Buddhist in period t, $J_{i,T}$ is a dummy which indicates whether household i is Jain in period t, $X_{i,T}$ refers to a vector of household-specific socio-economic controls, and $\mu_{i,T}$ denotes the residual. This model is useful in evaluating the binary decision of households to purchase meat, and the role of religion in determining this decision.

A point to note is that the set of socio-economic variables in the vector of controls $X_{i,T}$ is compendious. We choose to estimate the model using a concise set of explanatory variables for two reasons. Firstly, many of the explanatory variables that we finally excluded from our model were strongly correlated to the important control variables that we have already included in the model. Secondly, most of the excluded variables are time-invariant, and therefore their coefficients cannot be estimated using a fixed effects methodology.

The reference group for this estimation is households that identify themselves as Muslim, Christian, Sikh, Tribals, as belonging to other denominations, or do not ascribe to any religious denomination. This choice is motivated by the clear difference in tenets regarding vegetarianism between the two groups: Jains are obliged to be vegetarian, whereas Hindus and Buddhists are highly recommended to do so. We thus expect the (negative) effect of being Jain on meat consumption to be much higher than those of the other two

[8] As a robustness check, and for comparison purposes, we estimate the basic models using the Probit methodology as well. The results that we obtain confirm those of the LPM. Some of them are reported in Table 8 in the Appendix.

religions. None of the other religions impose any form of vegetarianism on their followers: while Islam forbids pork consumption, it does not restrict consumption of other forms of meat.[9]

In this estimation, we also include district-level and caste-level dummies, as well as a time fixed effect. Further, in order to control for unobserved heterogeneity across households, we also estimate the above model by including household-level fixed effects. However, we should note that the within-variation of religion is relatively low.

In order to test hypotheses 2 and 3 and to get a flavour of the determinants of a Hindu households' decision to eat meat, we estimate a LPM which predicts the relationship between whether meat was purchased by Hindu household i in the last 30 days. For this analysis, our model specification is:

$$M_{i,T} = \alpha_0 + S_{i,T}\alpha_1 + G_{i,T}\alpha_2 + D_{i,T}\alpha_3 + U_{i,T}\alpha_4 + \boldsymbol{X_{i,T}}\beta + \mu_{i,T} \tag{2}$$

where $M_{i,T}$ denotes whether household i purchased meat in the last 30 days, $S_{i,T}$ denotes membership in a religious group in period T, $G_{i,T}$ denotes membership in a non-religious group in period T, $D_{i,T}$ denotes a dummy for ownership of at least one communication device, and $U_{i,T}$ denotes whether adult men and women in household i use forms of media such as newspapers, radio or television frequently (or somewhat frequently) in period T respectively. The rest of the notation remains unchanged from model (1) above.

There are, however, two potential sources of endogeneity in the estimation of model (2): one is of correlated unobservables affecting both dependent variable and the dummy for membership in religious groups (there may be factors unobserved by us which may affect both the decision to consume meat, as well as membership in groups (such as how socially active they are, how often they eat out, etc.)). Another is that households may be selecting themselves into religious groups based on their common preferences

[9] Halal food is that which adheres to the restrictions on slaughtering animals and poultry, as dictated in the Koran. Muslims are required to eat halal meat.

for meat, thereby engendering the possibility of reverse causality. In order to address these concerns, we estimate a LPM using instrumental variable two-stage least squares (IV-LPM), treating this variable as endogenous.

We use two instruments as excluded instruments in the first-stage regression of $S_{i,T}$. The first instrument is the number of telephone connections per 100 of the population (at the state-level). This variable can be expected to strongly influence religious group membership, because better connectivity (through improved infrastructure) may facilitate social contact for members of groups, in line with the theoretical findings of Levy and Razin (2012). Moreover, it is unlikely to be directly related to the consumption of meat for Hindus, because 1) usually in India, meat is not ordered via telephone, and 2) we control for the household-level access to telephones in the second-stage equation.

For our second instrument, we divide the number of significant historical Hindu pilgrimage sites or temples in a state by its population in thousands, as a measure of the the density of important Hindu religious sites per unit of the population. We expect this variable to also be a strong determinant of membership in religious groups for Hindus. The important historical pilgrimage sites and temples are given exogenously, and one can argue that Hindu households living in states with more religiously salient sites are more likely to be involved in religious activities. However, this variable is constant over time. In order to introduce temporal variation, we divide the number of such sites by the population of that state. We present the significant Hindu pilgrim sites and temples that we have considered, along with the states where they are situated, in Table 6 in the appendix.

As the final step, and in order to control for unobserved heterogeneity at the household level as we did before, we also estimate the IV-LPM version of model (2) by including household-level fixed effects as well as the time fixed effect. Due to the fact that this model is able to account for both econometric issues of endogeneity and unobserved heterogeneity, we consider this the baseline model of this paper. Of course, one should keep in mind that the use of a fixed effects model eliminates the possibility to obtain coefficients on the time-invariant variables, and that the within-variation of some variables could be rel-

atively small. This may influence the precision of the estimation.[10]

In the fixed effects model, we do not include caste dummies because caste is expected to be time-invariant, but we do include district-level dummies, as many district boundaries changed between the two years and new districts were also created. According to the Government of India (2015), the number of districts in India increased from 600 in 2005 to 651 in 2012. This model is estimated using OLS for the pooled sample.

4 Results

This section provides the main econometric results of the paper that are relevant for testing Hypotheses 1 to 3.

4.1 Main Results

Columns 1 and 2 in Table 3 present results that are useful in testing Hypothesis 1: that of the LPM estimation using OLS, and the LPM with fixed effects[11] The results of column (1) suggest that Hindus, Buddhists and Jains are less likely to consume meat compared to the reference group, which is in line with our intuition. The marginal effects suggest that the probability for Hindus to eat meat is 0.134 units less than for the reference group in column (1), whereas it is 0.065 units less than for the reference group in column (2). The negative marginal effect is weakest for Buddhists in column (1), while it is strongly negative for Jains (which is in line with our intuition, given that Jainism explicitly bans the consumption of all forms of meat). The results of the fixed effects estimation in column (2) suggest insignificance for Buddhists and Jains, but this is perhaps driven by fewer members of these religions switching religions over the time frame (and thus, limited

[10] For a more detailed discussion on the impact of within variation on the precision of coefficients, see pp.715 of Cameron and Trivedi (2005).

[11] The Probit estimation results are included in the appendix, in column (1) of Table 8 in the Appendix. They are very similar to the estimation results of the LPM in column (1) of Table 3.

within-variation for these variables).

Both specifications suggest that higher incomes are associated with higher probabilities of purchasing meat. In addition, we find from both sets of models that larger households are more likely to eat meat, as are urban households (even though the variable is insignificant in column (2)). We also find that higher prices of meat are associated with a lower likelihood of consuming meat, and that this effect is significant in both models. A priori, it is not clear whether lentils and meat are substitutes or complements in the Indian diet. In the results of column (1), we find that higher prices of lentils are associated with a lower likelihood of eating meat, whereas this is reversed in column (2) when we control for unobserved heterogeneity.

The effects of higher education on meat consumption however are ambiguous: on average, the more educated are adult men and adult women in a household, the lower are their likelihoods of purchasing meat, as suggested in column (1). However once we control for unobserved heterogeneity, we find that more educated households are more likely to purchase meat. This may be explained by time-invariant factors that are correlated to education, such as dietary and nutritional awareness, or lifestyle, which are better captured using the household fixed effects in the results of column (2).

The results of Table 4 are the main results of the paper that are relevant to test Hypotheses 2 and 3. Column (2) includes the results of the IV-LPM, whereas column (3) includes the results of estimating an IV-LPM with household and year fixed effects, which are the baseline results of this paper. In column (1) of Table 4, we present the results of the estimation of the LPM using OLS as a benchmark.[12] The results of columns (1) to (3) include district and year dummies (they are included in the fixed effects model of column (3), due to changes in district boundaries over time time period), whereas the results of

[12] The Probit estimation results are provided in column (2) of Table 8 in the Appendix. We find that these results are similar in terms of signs of the coefficients, and their magnitudes, to the results of the LPM in column (1) of Table 4.

Table 3: Estimation results to test Hypothesis 1

Model Specification Column	Pooled LPM (1)	LPM with HH FE (2)
Whether household is Hindu	-0.134***	-0.065***
	(0.009)	(0.026)
Whether household is Buddhist	0.026	-0.074
	(0.027)	(0.090)
Whether household is Jain	-0.542***	0.0001
	(0.021)	(0.042)
Logarithm of income	0.009***	0.004***
	(0.001)	(0.001)
Education of male member	-0.010***	0.013**
	(0.003)	(0.006)
Education of female member	-0.031***	0.012**
	(0.003)	(0.006)
Number of members in household	0.010***	0.007***
	(0.001)	(0.001)
Whether household is urban	0.041***	0.006
	(0.007)	(0.029)
State-level unit value of lentils	-0.003***	0.002***
	(0.001)	(0.0008)
State-level unit value of meat	-0.002***	-0.001***
	(0.0002)	(0.0002)
Whether household owns a refrigerator	0.0003	0.009
	(0.005)	(0.009)
District fixed effects	Yes	Yes
Caste fixed effects	Yes	No
Household fixed effects	No	Yes
Time fixed effect	Yes	Yes
Observations	50642	50642

Notes: Dependent variable in columns (1) and (2) is a dummy for whether the HH purchased a positive quantity of meat in the last 30 days to the date of the survey, or not (capped at a maximum of 10 kilograms per month). Marginal effects are reported in dydx terms. Reference group includes Muslims, Christians, Sikhs, Tribals, other religions and those with no religious affiliation. Models include district, and year dummies in both columns, and caste dummies in column (1). Standard errors are clustered at the household level. Sampling weights are used for the estimation in column (1) as specified in the IHDS user manual, but not in the results of column (2), as fixed effects estimations need the weight to be constant for a given unit, which is not the case for this model. *,** and *** respectively denote significance at 10%, 5% and 1% levels. The coefficient of the constant has not been reported.

columns (1) and (2) also include caste dummies.[13]

We find that membership in religious groups has a negative effect on meat consumption in both models presented in columns (2) and (3) (which is significant at the 10% and 1% levels, respectively in columns (2) and (3)), whereas membership in groups of a non-religious nature has a positive (and significant at the 1% level) effect, providing strong evidence in favour of Hypothesis 2.[14] The marginal effects suggest that Hindu households that are members of non-religious groups are between 0.05 and 0.07 units more likely to purchase meat per month than non-member Hindu households. Likewise, both the ownership of at least one type of communication device, as well as regular use of sources of media, result in a higher likelihood of purchasing meat for Hindu households in the results of columns (2) and (3), providing support for our hypothesis concerning the effects of globalisation on households' meat consumption decisions.

In the specification of column (3), we find that more control variables are insignificant, compared to the model of columns (1) and (2). Once we control for unobserved heterogeneity in column (3) using fixed effects, we find that the variables for urban residence, education, as well as the unit price of lentils in the state are no longer significant in determining the probability of purchase of meat amongst Hindu households. This is likely to be driven by less within-variation of these variables. We find that richer Hindu households are more likely to eat meat than households earning a lower income, whereas households with more educated adult members (males and females) are less likely to eat meat than less educated households in the results of column (2). Moreover, larger Hindu households are more likely to purchase meat compared to smaller households. We find consistent evidence to suggest that higher meat prices are associated with a smaller like-

[13] The number of observations used to estimate the model differs in column (3) compared to columns (1) and (2), because of singleton groups: certain district dummies perfectly predict the outcome variable, and thus these observations are dropped.

[14] Some households are more social than others, which implies that they are members of more non-religious groups. We also estimate the IV-LPM with household and year fixed effects, using a continuous variable for the number of groups, as a robustness check. We find that these results are confirmed, and households that are members of more groups are more likely to eat meat. These results can be provided on request.

lihood of purchasing meat (and we find the same result for lentil prices in column (2), which points more to the likelihood of the two being complementary to one another in the Indian diet, rather than them being substitutes). Moreover, we also find that Hindu households that owned a refrigerator are likely to have a significantly higher likelihood of purchasing meat compared to those that didn't from the results of column (3), which is intuitive given that meat storage requires refrigeration.

The results of the benchmark LPM in column (1) of Table 4 are similar to those of columns (2) and (3), except for the coefficient on the variable for membership in religious groups, which is insignificant when we do not control for endogeneity of the variable, or for unobserved heterogeneity.

The first-stage estimation results corresponding to the second-stage results of columns (2) and (3) of Table 4 are provided in columns (1) and (2) of Table 7 in the appendix. The coefficients on the two excluded instruments are intuitive: a higher density of telephone connections has a positive impact on the likelihood of a Hindu household to join a religious group. Additionally, a higher density of religious pilgrim sites and temples in a state is also more likely to stimulate membership in religious groups for Hindus, as one can expect. The estimation test results are provided at the bottom of Table 7. The Cragg-Donald F-statistics are consistently higher than the Stock-Yogo critical values in the results of both columns, which provides support for the strength of our instruments (Stock and Yogo, 2005). We find that the Hansen-J statistic for over-identification in both columns suggests that the null hypothesis that the instruments are uncorrelated with the error term, and thus correctly excluded from the final model, cannot be rejected at the 1% level (it is borderline for the results of columns (2)).

5 Conclusion and Policy Implications

Our objective in this paper is to study the determinants of the choice to consume meat amongst households in India, a country that is renowned for its strong vegetarian tra-

Table 4: Models using binary dependent variable

Model Specification	LPM	IV LPM	IV LPM with Fixed Effects
Column	(1)	(2)	(3)
Religious group membership	-0.0001	-0.148*	-0.243***
	(0.007)	(0.090)	(0.083)
Non-religious group membership	0.030***	0.055***	0.070***
	(0.005)	(0.016)	(0.018)
Whether household owns at least one communication device	0.023***	0.022***	0.024**
	(0.005)	(0.005)	(0.008)
Whether household frequently uses media	0.029***	0.033***	0.032***
	(0.006)	(0.006)	(0.010)
Logarithm of income	0.009***	0.009***	0.004***
	(0.001)	(0.001)	(0.002)
Education of male member	-0.018***	-0.016***	0.008
	(0.004)	(0.004)	(0.007)
Education of female member	-0.037***	-0.036***	0.010
	(0.004)	(0.004)	(0.007)
Number of members in household	0.009***	0.009***	0.006***
	(0.001)	(0.001)	(0.001)
Whether household is urban	0.014**	0.012	0.014
	(0.008)	(0.008)	(0.033)
State-level unit value of lentils	-0.003***	-0.004***	0.001
	(0.001)	(0.0008)	(0.001)
State-level unit value of meat	-0.002***	-0.002***	-0.001***
	(0.0002)	(0.0003)	(0.0003)
Whether household owns a refrigerator	-0.003	0.002	0.018*
	(0.006)	(0.007)	(0.010)
District fixed effects	Yes	Yes	Yes
Caste fixed effects	Yes	Yes	No
Household fixed effects	No	No	Yes
Time fixed effect	Yes	Yes	Yes
Observations	42366	42366	30126

Notes: Dependent variable in columns (1) to (3) is a dummy for whether the HH purchased a positive quantity of meat in the last 30 days prior to the date of the survey (capped at a maximum of 10 kilograms per month). Marginal effects are reported in dydx terms. Sample is restricted to the Hindu households. All model specifications include district, caste and year dummies (except the specification in column (3), which does not include caste dummies). Standard errors are clustered at the household level. Sampling weights are used, as specified in the IHDS user manual. *,** and *** respectively denote significance at 10%, 5% and 1% levels. The coefficient of the constant has not been reported.

ditions. Hinduism, the largest religion in India, has encouraged its followers to refrain from eating meat. Despite geographic and cultural differences in meat consumption patterns across India, in recent times, many Hindus have begun to consume meat (even if in small quantities compared to other countries). In this paper, we show that the forces of globalisation and those of peer effects may have had an impact on households' meat consumption decisions.

We find that Hindu households are more likely to consume meat if they are members of some sort of social network or group, whereas they are less likely to consume meat specifically if they are members of religious groups. Moreover, we find that Hindu households that are more exposed to western lifestyles, measured by access to at least one telecommunication device, or frequent use of media such as radio, newspapers and television, are more likely to eat meat.

We show that this exposure, as well as increased social interactions amongst Hindus, have played an important role in the choice to consume meat. This has important repercussions for climate change policy in India, given that increased meat production may drive higher emissions of GHGs, and lead to higher eutrophication, and changes in land use patterns. On the one hand, with economic development, one can expect that more Indian households will be exposed to the forces of globalisation, and may also increase their social participation. On the other hand, as can be inferred from the theoretical framework of Levy and Razin (2012), adherence to religious norms may also waver as these forces of globalisation strengthen. Therefore, the likelihood of more households choosing to eat meat may increase.

From a nutritional perspective, this is a positive outcome, because a nutritionally diversified diet is important for alleviating public health concerns in developing countries. However, because of the GHG implications related to meat production, it is important that governments in developing countries, particularly in countries like India that have a large share of vegetarians, design and implement sustainable NRDs that take into account not only the given cultural and religious norms, but also their environmental implica-

tions (a normative finding, which can be supported by the recent findings of Springmann et al. (2018)). In this context, policymakers have a big challenge to implement NRDs that ensure that individuals ensure adequate protein intake, without having a significantly adverse environmental impact, while still considering the practice of religious norms and customs.

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Appendix: Additional Tables

Table 5: Religious scriptures related to vegetarianism

Religion	Source	Scripture
Hinduism	Mahabharata (Anu.115.38-39)	"i£ïï£iHe who purchases flesh, kills living creatures through his money. He who eats flesh, kills living beings through his eating. He who binds or seizes and actually kills living creatures is the slaughterer. These are the three sorts of slaughter through each of these acts. He who does not himself eat flesh but approves of an act of slaughter, becomes stained with the sin of slaughter."
	Mahabharata, (Anu.116.1)	"Yudhisthira said: Alas, those cruel men who, not caring for various other sorts of food, want only flesh, are really like great Rakshasas (meat-eating demons)."
	Bhagavata Purana (11.5.14)	"i£ïï£iThose who are ignorant of real dharma and, though wicked and haughty, account themselves virtuous, kill animals without any feeling of remorse or fear of punishment. Further, in their next lives, such sinful persons will be eaten by the same creatures they have killed in this world."
	Rig-veda (10.87.16)	"One who partakes of human flesh, the flesh of a horse or of another animal, and deprives others of milk by slaughtering cows, O King, if such a fiend does not desist by other means, then you should not hesitate to cut off his head."
	Manu-samhita (5.48-49)	"Meat can never be obtained without injury to living creatures, and injury to sentient beings is detrimental to the attainment of heavenly bliss; let him therefore shun the use of meat. Having well considered the disgusting origin of flesh and the cruelty of fettering and slaying corporeal beings, let him entirely abstain from eating flesh."
	Manu-samhita (5.27)	"One may eat meat when it has been sprinkled with water, while Mantras were recited, when Brahmanas desire (one's doing it), when one is engaged (in the performance of a rite) according to the law, and when one's life is in danger."
	Manu-samhita (5.31)	"The consumption of meat (is befitting) for sacrifices,' that is declared to be a rule made by the gods; but to persist (in using it) on other (occasions) is said to be a proceeding worthy of Rakshasas (demons)."
Buddhism	Angulimaliya Sutra	"And the Lord added: So it is, Manjushri. There is not a single being, wandering in the chain of lives in endless and beginning less samsara, that has not been your mother or your sister. An individual, born as a dog, may afterward become your father. Each and every being is like an actor playing on the stage of life. One'ï£is flesh and the flesh of others is the same flesh. Therefore the Enlightened Ones eat no meat. Moreover, Manjushri, the dharmadhatu (from which all dharma, or phenomena arise) is the common nature of all beings, therefore Buddhas refrain from eating meat."
	Brahmajala Sutra - Third Minor Precept	"A disciple of the Buddha must not deliberately eat the flesh of any being, for if he does so, he thereby cuts off great compassion, kindness, and the seed of the Buddha-nature and causes all beings who encounter him to avoid him. Therefore, all Bodhisattvas must abstain from eating the flesh of any being, for meat-eating is the source of limitless offences. Hence, if a Bodhisattva deliberately eats meat, he thereby violates this minor precept and commits defiling offence."
Jainism	Acharang Sootra (1.6.55)	"Some kill living beings for sacrificial purposes, some kill for their skins, some kill for their flesh, some for the blood, heart, liver, fat, feathers, or teeth, some with specific reasons, some without reason, some out of fear (defence). He who is disinclined from killing the smallest living beings knows what suffering is because he who knows his own happiness and pains, knows others' too, and he who knows others' feelings knows his own feelings. This is the way one must compare himself with others. He who has obtained this knowledge would not wish to live at the expense of other living beings."
	Pratikraman, Lesson 7, First Minor Vow	In reference to this vow to restrain from violence towards any creature, there are five acts or deeds which should be known and avoided. They are: 1. Tying animals where it could hurt them, or putting them in cages where there is no freedom, 2. Beating them with sticks or by any other means, 3. Piercing their nose, ear, or amputating limbs or any part of the body, 4. Making them carry heavy load, or 5. Depriving them of food, shelter, etc. If I have indulged in any of the above acts, then may all my such sins be dissolved. Tassa Michchhami dukkadam. (I seek forgiveness for all of it.)

Sources- Hindu scriptures: "https://www.thespiritualscientist.com/2012/01/do-the-vedic-literature-allow-meat-eating-did-hinduism-adopt-vegetarianism-from-buddhism/", "http://www.sacred-texts.com/hin/manu/manu05.htm", Buddhist scriptures:" http://www.shabkar.org/scripture/sutras/index.htm", Jain scriptures: "https://sites.fas.harvard.edu/ pluralsm/affiliates/jainism/ahimsa/ahimsala.htm" (accessed 26th September, 2018)."

Table 6: Significant Hindu Pilgrimage Sites and Temples

State	Names of pilgrim sites and temples
Jammu and Kashmir	Amarnath, Vaishno Devi
Himachal Pradesh	Dharamshala
Punjab	Amritsar
Uttaranchal	Badrinath, Kedarnath, Rishikesh
Haryana	Kurukshetra
Uttar Pradesh	Allahabad, Ayodhya, Fatehpur Sikri, Haridwar, Mathura, Varanasi, Vrindavan
Rajasthan	Amer, Nathdwara, Pushkar
Bihar	Gaya, Nalanda
Madhya Pradesh	Ujjain
West Bengal	Calcutta
Gujarat	Dwarka, Somnath
Orissa	Bhubaneswar, Konarak, Puri
Maharashtra	Mahabaleshwar, Nashik
Karnataka	Sravanabelagola, Udupi
Andhra Pradesh	Bhadrachalam, Srisailam, Tirupati
Kerala	Ernakulum, Thiruvananthapuram, Trishur
Tamil Nadu	Chidambaram, Kanchipuram, Kanniyakumari, Rameswaram, Madurai

Notes: The number of significant Hindu pilgrimage sites are coded as zero in the states/union territories of Assam, Chattisgarh, Jharkhand, Delhi, as well as the north-east (Sikkim, Manipur, Mizoram, Meghalaya, Arunachal Pradesh, Tripura and Nagaland). Sources: "Holy Places, The Heart of Hinduism" (Iskcon Educational Services); "Study on Identification of Hindu Pilgrimage Circuit Linking various sites in Nepal with Bordering states of India" (Ministry of Tourism (GOI), 2016).

Table 7: First-stage Estimations

Model Specification Column	First-stage (IV-LPM) (1)	First-stage (IV-LPM with Fixed Effects) (2)
Number of temples and pilgrim sites per unit of population (state-level)	0.972***	1.198***
	(0.070)	(0.083)
Telephones per 100 of population (state-level)	0.880***	0.921***
	(0.115)	(0.139)
Non-religious group membership	0.172***	0.204***
	(0.004)	(0.007)
Whether household owns at least one communication device	-0.002	-0.026***
	(0.004)	(0.007)
Whether household frequently uses media	0.027***	0.052***
	(0.004)	(0.007)
Logarithm of income	0.0003	-0.0006
	(0.001)	(0.002)
Education of male member	0.012***	0.005
	(0.003)	(0.006)
Education of female member	0.005*	0.008
	(0.003)	(0.006)
Number of members in household	0.0005	0.002
	(0.0005)	(0.001)
Whether household is urban	-0.009*	-0.021
	(0.005)	(0.026)
State-level unit value of lentils	-0.004***	-0.004***
	(0.001)	(0.001)
State-level unit value of meat	-0.003***	-0.004***
	(0.0002)	(0.0003)
Whether household owns a refrigerator	0.031***	0.037***
	(0.005)	(0.009)
District fixed effects	Yes	Yes
Caste fixed effects	Yes	No
Household fixed effects	No	Yes
Time fixed effect	Yes	Yes
Observations	42366	30126
Cragg Donald F-statistic	100.344	96.819
P-value	0	0
Kleibergen-Paap F-statistic	128.879	127.799
P-value	0	0
Over-identification test (Hansen J-statistic)	1.347	6.573
P-value	0.246	0.010

Notes: Dependent variable in columns (1) and (2) is membership in a religious groups. Sample is restricted to the Hindu households. The specifications include district, caste and year dummies (the model in column (2) does not include caste dummies). The Stock-Yogo weak identification test critical value for one endogenous variable is 19.93 (at the 10% maximal IV size). Sampling weights are used for the estimations in columns (1) and (2), according to the IHDS manual. District, caste and year effects are partialled out in order to calculate the over-identification test results. Standard errors are clustered at the household level. *,** and *** respectively denote significance at 10%, 5% and 1% levels. The coefficient of the constant has not been reported.

Table 8: Probit Estimation results

Model Specification Column	Probit (Hypothesis 1) (1)	Probit (Hypotheses 2 and 3) (2)
Whether household is Hindu	-0.250***	
	(0.014)	
Whether household is Buddhist	-0.091***	
	(0.033)	
Whether household is Jain	-0.381***	
	(0.003)	
Religious group membership		0.005
		(0.009)
Non-religious group membership		0.039***
		(0.007)
Whether household owns at least one communication device		0.030***
		(0.007)
Whether household frequently uses media		0.040***
		(0.008)
Logarithm of income	0.015***	0.013***
	(0.002)	(0.002)
Education of male member	-0.011**	-0.025***
	(0.005)	(0.005)
Education of female member	-0.045***	-0.054***
	(0.005)	(0.006)
Number of members in household	0.014***	0.013***
	(0.001)	(0.001)
Whether household is urban	0.043***	0.012
	(0.010)	(0.011)
State-level unit value of lentils	-0.002***	-0.002***
	(0.001)	(0.001)
State-level unit value of meat	-0.003***	-0.003***
	(0.0003)	(0.0003)
Whether household owns a refrigerator	0.0009	-0.008
	(0.009)	(0.009)
District fixed effects	Yes	Yes
Caste fixed effects	Yes	Yes
Household fixed effects	No	No
Time fixed effect	Yes	Yes
Observations	49659	41171

Notes: Dependent variable in columns (1) and (2) is a dummy for whether the HH purchased a positive quantity of meat in the last 30 days to the date of the survey, or not (capped at a maximum of 10 kilograms per month). Marginal effects are reported in dydx terms, and calculate at the means of the explanatory variables. Reference group in column (1) includes Muslims, Christians, Sikhs, Tribals, other religions and those with no religious affiliation. Models include district, caste and year dummies. Standard errors are clustered at the household level. Sampling weights are used for the estimations in columns (1) and (2). *,** and *** respectively denote significance at 10%, 5% and 1% levels. The coefficient of the constant has not been reported.

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