

**Appliance Ownership in India:
Evidence from NSSO Household Expenditure
Surveys 2004-05 and 2009-10**

Discussion Paper

September 2012



Prayas Energy Group

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A Discussion Paper

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About Prayas

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1. Introduction

In this paper we analyze ownership patterns and distribution of three major appliances-fans, televisions and refrigerators in Indian households using two rounds of all India National Sample Survey Organization (NSSO) expenditure surveys (NSSO, 2005, 2010). In particular, we seek answers to three main questions: a) which households acquired appliances for the first time during the period between the two surveys; b) what was the pattern of appliance acquisition across various states in India and (c) what are the major factors that might be influencing appliance acquisition?

There are two major household sample surveys that provide information on ownership of appliances, household expenditure surveys which are conducted every five years by the National Sample Survey Organization (NSSO) of the Government of India and household survey jointly carried out by the University of Maryland and National Council of Applied Economic Research (NCAER) in 2004-2005 (Desai et al., 2005). The NCAER-Maryland survey has recorded ownership of appliances only for the year 2004-05 and hence cannot be used to analyze ownership patterns over a time period. Here, we use the NSSO surveys to find ownership trends over a period of five years between 2004-05 and 2009-10.

The findings of this study can have several applications. In the area of energy efficiency, the findings can be used to design customized programs for households based on their income and region wise ownership patterns. The findings can also be used as an indicator of standard of living, rural inequity, quality of power supply and other such allied areas. We expect several other areas of policy analysis to benefit from our analysis.

2. Data and Methodology

NSSO conducts household consumer expenditure surveys of an all-India

representative sample of households on consumption and expenditure on various goods and services every five years¹. This study is based on two quinquennial rounds (61st and 66th) of the household expenditure surveys carried out by NSSO in 2004-2005 and 2009-2010. In the 61st round 79298 rural households and 45346 urban households across 7999 villages and 4602 urban blocks were surveyed. In the 66th round, 59119 rural households and 41736 urban households across 7524 villages and 5284 urban blocks were surveyed. For our analysis, we cleaned the survey dataset for the two rounds and excluded those households which had missing values.

We use the “pseudo-panel data approach” (Deaton, 1986) to analyze households at the same decile of income distribution over time. Using data from the surveys, we first group households into income deciles defined by mean monthly per capita expenditure (MPCE) as a proxy for their income. We then estimate appliance ownership for these income groups in 2004-05 and 2009-10 using the data from the respective surveys. Using population estimates of those years we find the total number of households which own appliances in those years. The difference between the two estimates gives us the number of households which acquired appliances for the first time between the two survey rounds. We do the analysis separately for rural and urban households. We use the same approach to find the change in appliance ownership across major states of India. We also look into the correlation between access to electricity and appliance ownership in the major states.

In the surveys, the respondents were asked to state, among various things, whether they own a particular electrical appliance. However, the respondents were not asked the total number

¹ The survey data is publically available and can be obtained from the Ministry of Statistics and Programme Implementation, Government of India. Please visit www.mospi.nic.in for more details about the surveys.

of appliances owned by a household. Hence, the surveys can only be used to estimate the change in the ownership of appliances between the two surveys and not the total appliances acquired or possessed by the households. Here, we specifically use the word ‘acquisition’ and not ‘bought’ as it is not clear that people actually bought the appliances. People might have received appliance as gifts or donations or might have borrowed them from someone.

3. Which households acquired the appliances?

In this section we find trends in appliance ownership and acquisition across income households in rural and urban areas.

Key Findings

Fans

- Urban areas are almost saturated with fans with 92% of the urban households owning fans. On the other hand, rural areas are still far from being saturated with an ownership of 58%. Even middle and rich income groups in rural areas are yet to have fans (Figure 1 and 2).

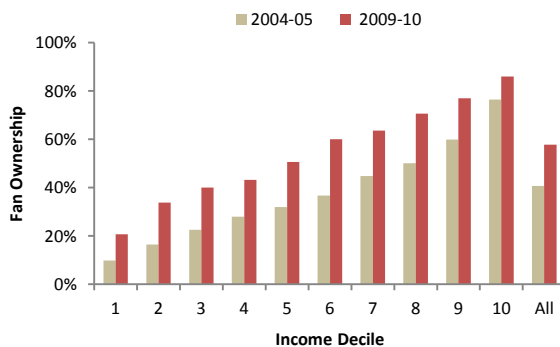


Figure 1: Fan ownership across income deciles in rural areas in 2004-05 and 2009-10

- Rate of growth in ownership was greater in rural areas (54%) than in

urban areas (32%). In the rural areas, around 33 million households were new owners of fans compared to around 15 million in the urban areas. Figure 3 shows this dominance of rural areas in fan acquisition across all income deciles.

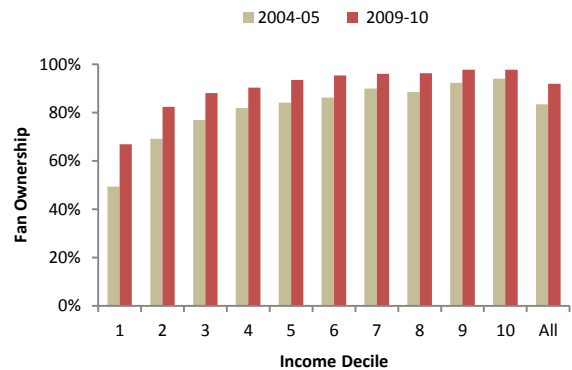


Figure 2: Fan ownership across income deciles in urban areas in 2004-05 and 2009-10

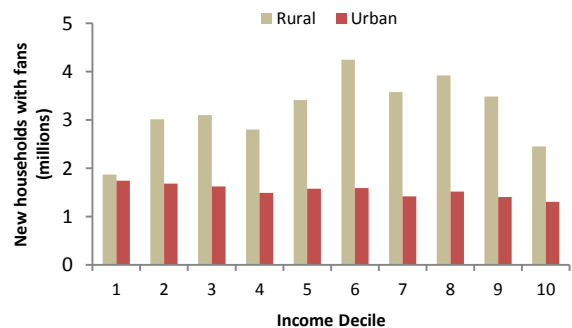


Figure 3: Number of households which acquired fans for the first time between 2004-05 and 2009-10 (millions)

Televisions

- After fan, television is the most sought after appliance. The ownership pattern seems to follow the same trajectory as fans. In urban areas, 77% of the households own television compared to 44% in the rural areas (Figure 4 and 5).

- Again like fans, there were more households who acquired televisions for the first time in rural areas (29 million) compared to the urban areas (14 million). But, unlike fans, in rural areas more number of higher income households acquired televisions than lower income households. On the other hand, it was opposite for the urban areas. More number of lower income households acquired televisions than their richer counterparts (Figure 6).

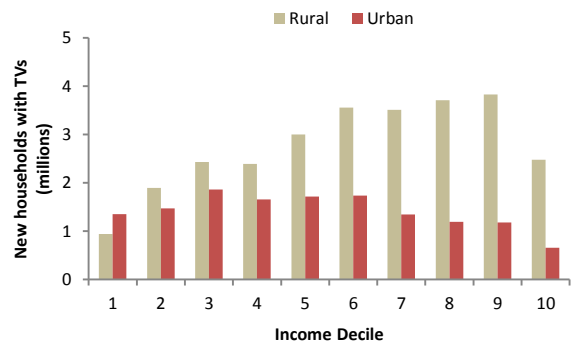


Figure 6: Number of households which acquired televisions for the first time between 2004-05 and 2009-10 (millions)

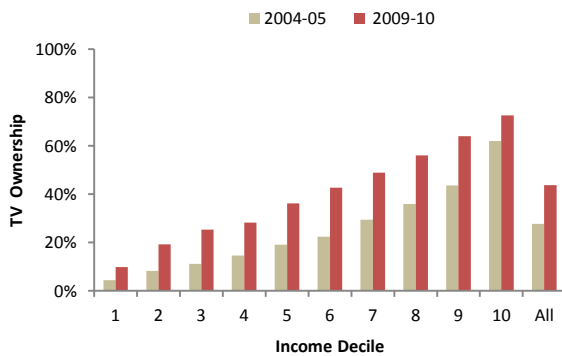


Figure 4: Television ownership across income deciles in rural areas in 2004-05 and 2009-10

Refrigerators

- Refrigerator ownership is low in urban areas (41%) and very low in rural areas (8%) (Figure 7 and 8).

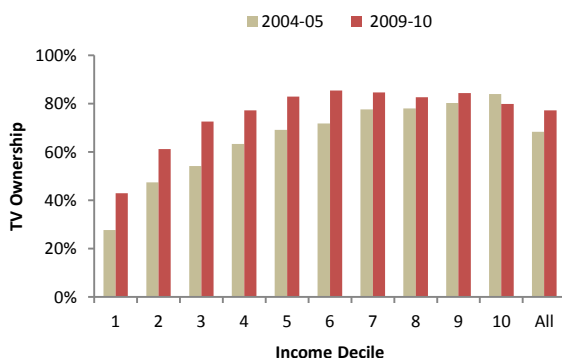


Figure 5: Television ownership across income deciles in urban areas in 2004-05 and 2009-10

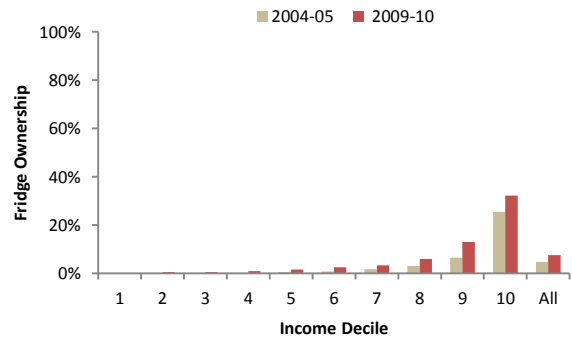


Figure 7: Refrigerator ownership across income deciles in rural areas in 2004-05 and 2009-10

- Refrigerator is still a higher income segment appliance as can be clearly seen from figures 7 and 8. Even in urban areas only the medium and higher income groups own refrigerators.

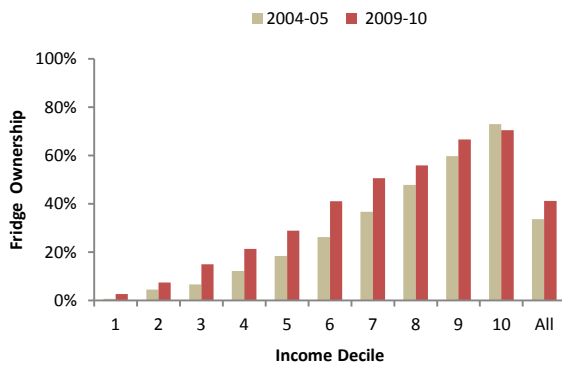


Figure 8: Refrigerator ownership across income deciles in urban areas in 2004-05 and 2009-10

- Around 90 lakhs households in urban areas and 51 lakhs households in rural areas became new owners of refrigerators. Bulk of households which acquired refrigerators for the first time belong to high income groups in both urban and rural areas. This shows that refrigerator is still a luxury item in India (Figure 9).

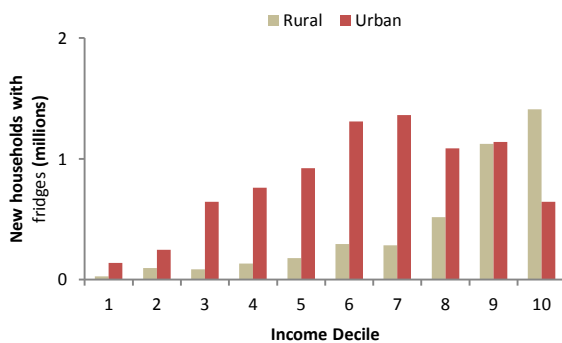


Figure 9: Number of households which acquired refrigerators for the first time between 2004-05 and 2009-10 (millions)

4. Where were the appliances acquired?

In order to identify geographic distribution and pattern of appliance acquisition, we analyze appliance ownership data for 19 major states in

India which comprise 96 percent of India's population. The major findings are as follows:

Key Findings

Fans

- Punjab (97%), Haryana (94%), and Andhra Pradesh (88%) are the top three states with the highest ownership of fans in the rural areas. Again in urban areas the same states, Punjab (97%), Haryana (97%), and Andhra Pradesh (96%), command leadership in fan ownership (Figure 10 and 12).

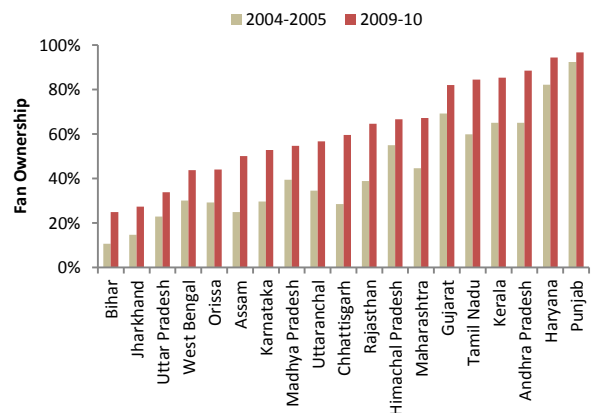


Figure 10: Fan ownership in rural areas across major states in 2004-05 and 2009-10

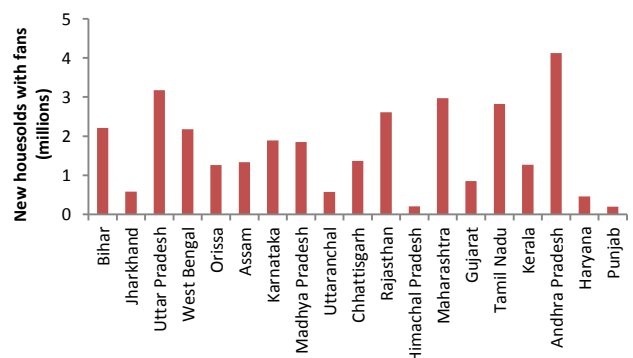


Figure 11: Number of rural households which acquired fans for the first time across major states between 2004-05 and 2009-10 (millions)

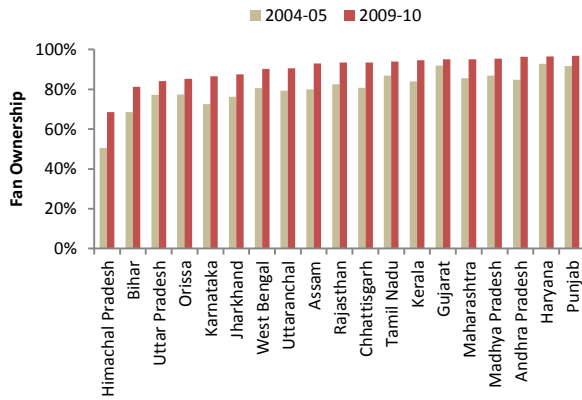


Figure 12: Fan ownership in urban areas across major states in 2004-05 and 2009-10

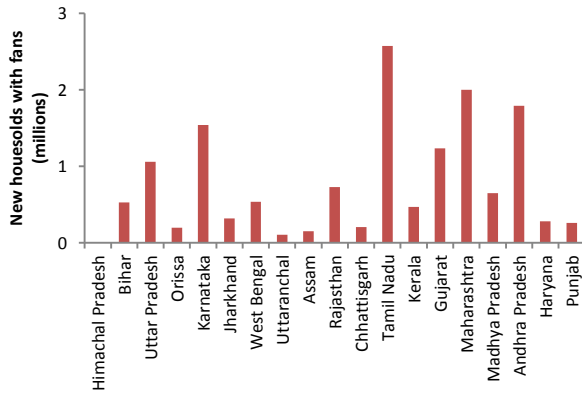


Figure 13: Number of urban households which acquired fans for the first time across major states between 2004-05 and 2009-10 (millions)

- In rural areas, Andhra Pradesh (13%), Uttar Pradesh (10%) and Maharashtra (9%) contributed most to the change in fan ownership in the period between the two surveys. In urban areas, Tamil Nadu (17%), Maharashtra (13%) and Andhra Pradesh (12%) had the highest shares in change in fan ownership (Figure 11, 13, 14 and 15).
- Chhattisgarh (31%), Rajasthan (26%) and Assam (25%) showed maximum jump in fan ownership in rural areas. In urban areas, Himachal Pradesh (18%)

showed the maximum increase followed by Karnataka (14%) and Assam (13%).

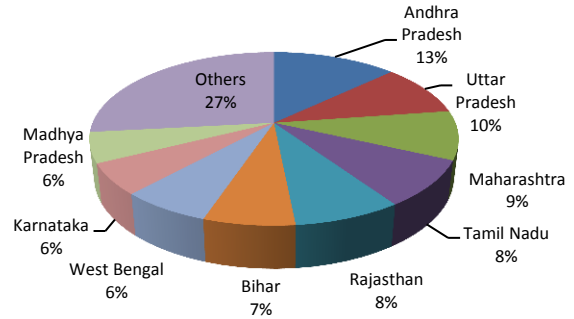


Figure 14: Contribution of major states in the total number of rural households which acquired fans for the first time between 2004-05 and 2009-10.

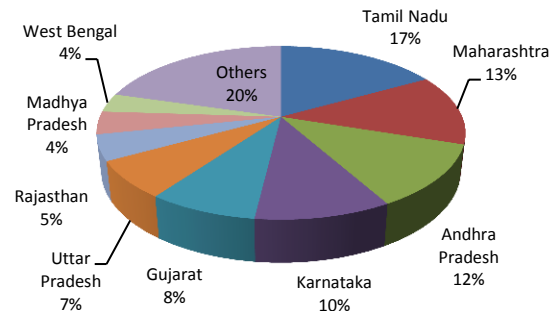


Figure 15: Contribution of major states in the total number of urban households which acquired fans for the first time between 2004-05 and 2009-10.

Televisions

- In rural areas, Punjab (81%), Himachal Pradesh (80%), and Tamil Nadu (79%) are the top three states with the highest ownership of televisions in the rural areas. In urban areas Assam (85%), Tamil Nadu (85%), and Uttaranchal (85%) lead the table of television ownership (Figure 16 and 18).
- In rural areas, Tamil Nadu (16%), Andhra Pradesh (12%) and Uttar Pradesh (8%) contributed most to the

change in television ownership in the period between the two surveys. In urban areas, Tamil Nadu (20%), Andhra Pradesh (11%) and Maharashtra (11%) had the highest shares in change in television ownership (Figure 17, 19, 20 and 21).

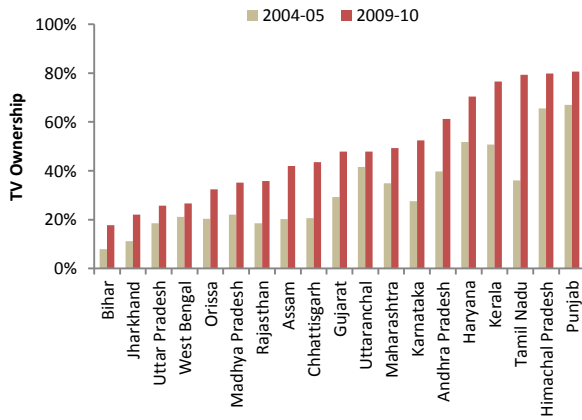


Figure 16: Television ownership in rural areas across major states in 2004-05 and 2009-10

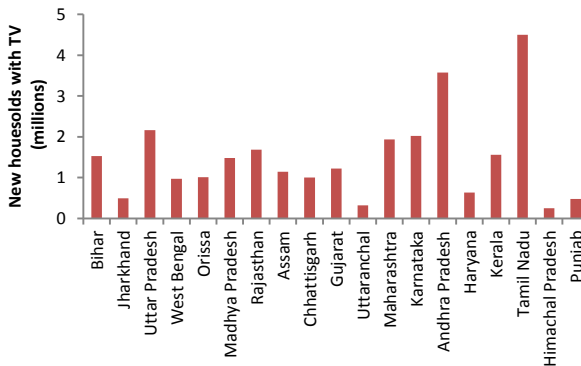


Figure 17: Number of rural households which acquired televisions for the first time across major states between 2004-05 and 2009-10 (millions)

- Tamil Nadu (43%), Kerala (26%) and Karnataka (25%) showed maximum increase in television ownership in rural areas. In urban areas, Assam (20%) showed the maximum increase

followed by Tamil Nadu (14%) and Kerala (14%).

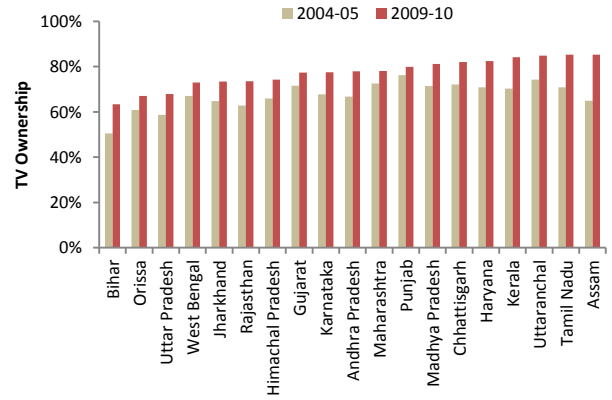


Figure 18: Television ownership in urban areas across major states in 2004-05 and 2009-10

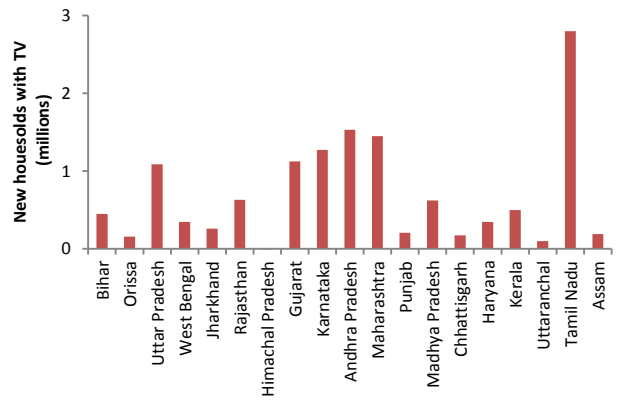


Figure 19: Number of urban households which acquired televisions for the first time across major states between 2004-05 and 2009-10 (millions)

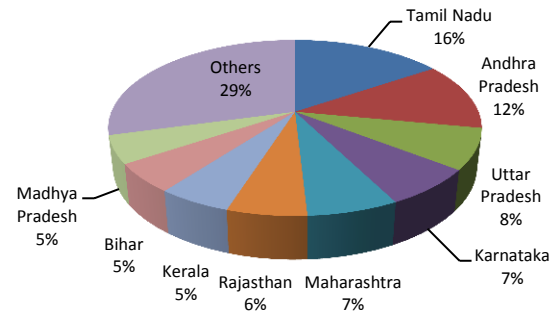


Figure 20: Contribution of major states in the total number of rural households which acquired televisions for the first time between 2004-05 and 2009-10.

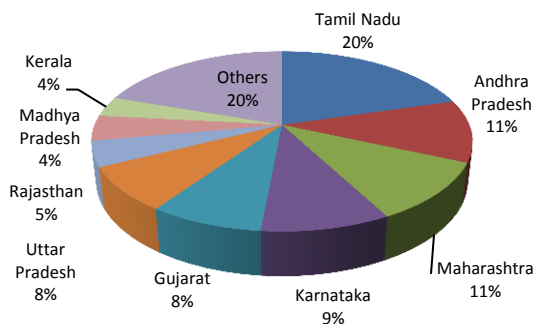


Figure 21: Contribution of major states in the total number of urban households which acquired televisions for the first time between 2004-05 and 2009-10.

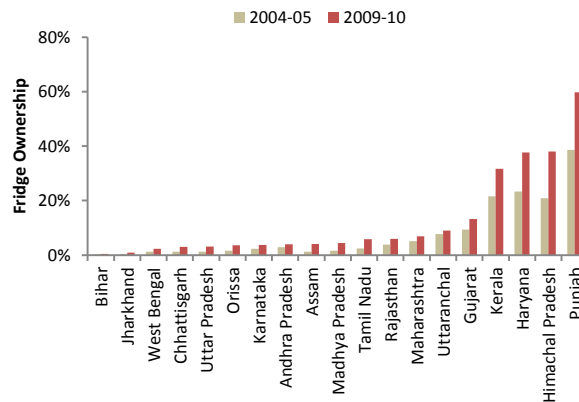


Figure 22: Refrigerator ownership in rural areas across major states in 2004-05 and 2009-10

Refrigerators

- Punjab (60%), Himachal Pradesh (38%), Haryana (38%) and Kerala (32%) dominated in terms of refrigerator ownership in rural areas. In urban areas, the same states, Punjab (97%), Haryana (97%), and Himachal Pradesh (96%) were the leaders (Figures 22 and 24).
- In rural areas, Punjab (14%), Kerala (12%) and Uttar Pradesh (10%) contributed most to the change in refrigerator ownership in the period between the two surveys. In urban areas, Maharashtra (15%), Tamil Nadu (12%) and Andhra Pradesh (11%) had the highest shares in change in refrigerator ownership (Figures 23, 25 and 27).
- Punjab (21%), Himachal Pradesh (17%) and Haryana (14%) showed maximum jump in refrigerator ownership in rural areas. In urban areas, Assam (22%) showed the maximum increase followed by Chhattisgarh (15%) and Haryana (14%).

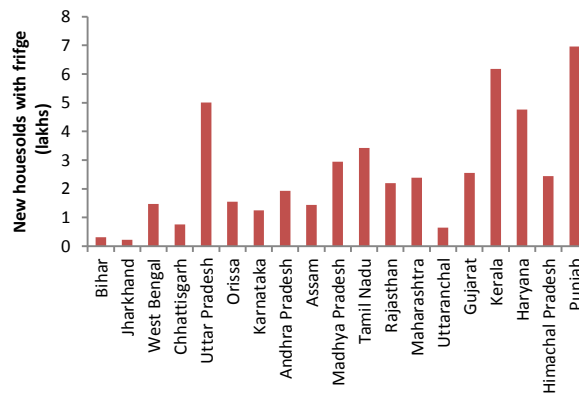


Figure 23: Number of rural households which acquired refrigerators for the first time across major states between 2004-05 and 2009-10 (lakhs²)

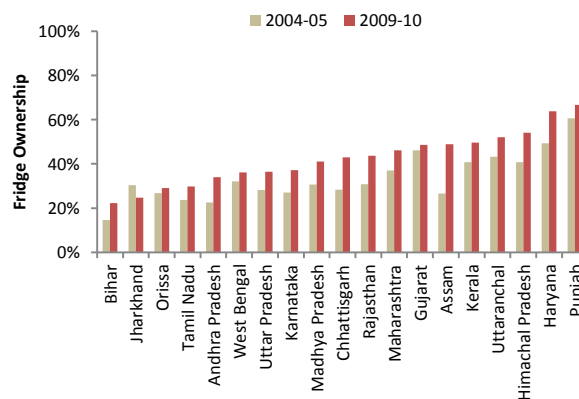


Figure 24: Refrigerator ownership in urban areas across major states in 2004-05 and 2009-10

² 1 lakh=100,000

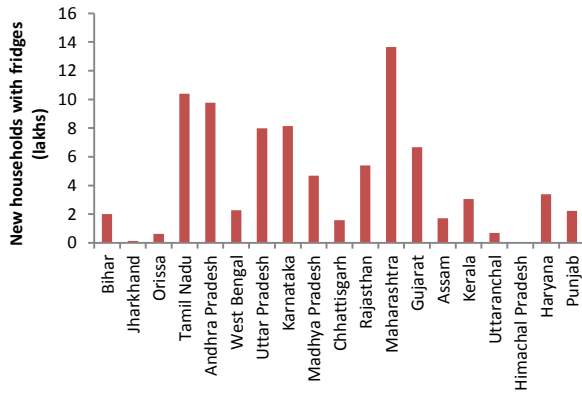


Figure 25: Number of urban households which acquired refrigerators for the first time across major states between 2004-05 and 2009-10 (millions)

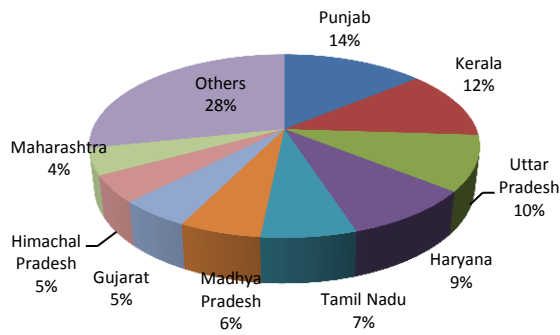


Figure 26: Contribution of major states in the total number of rural households which acquired refrigerators for the first time between 2004-05 and 2009-10.

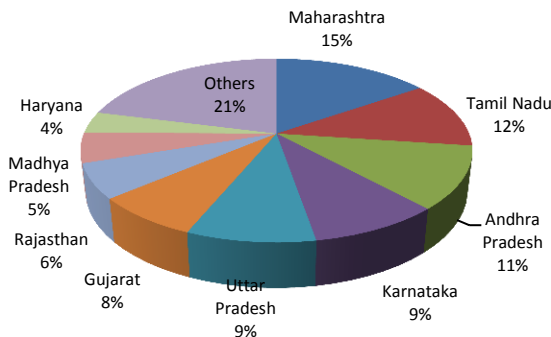


Figure 27: Contribution of major states in the total number of urban households which acquired refrigerators for the first time between 2004-05 and 2009-10.

5. Factors influencing appliance acquisition

In this section we identify major factors that influence appliance acquisition. There may be several factors that affect appliance acquisition and they may be different for different appliances. However, we identify two main factors that influence ownership: income and access to electricity. For results and discussions please refer to figures 28-33. In all these figures, in the left vertical axis we have MPCE in terms of Indian rupees and in the right vertical axis we have electrification and appliance ownership. Both electrification and appliance ownership are expressed in percent. In the horizontal axis states are arranged in ascending order of MPCE. As stated earlier, in this paper we consider MPCE as a proxy for income.

Income

- Income plays a major role in appliance acquisition. From the figures we can see that, states which have high levels of income have high ownership of appliances. This can be seen more clearly in rural areas. From the figures 28 and 30 we can see that fan and television ownership in rural areas gradually increases with income.
- As seen earlier fans and television ownership is quite higher in the lower and medium income households compared to refrigerators. Refrigerator is still belongs to the luxury segment. People are likely to own refrigerators if they have higher levels of income and reliable quality supply of electricity. In rural areas, there seems to be a MPCE cutoff, around ₹1200, after which ownership of refrigerators drastically increases (figure 32). In urban areas, refrigerator ownership increased gradually with MPCE (figure 33).

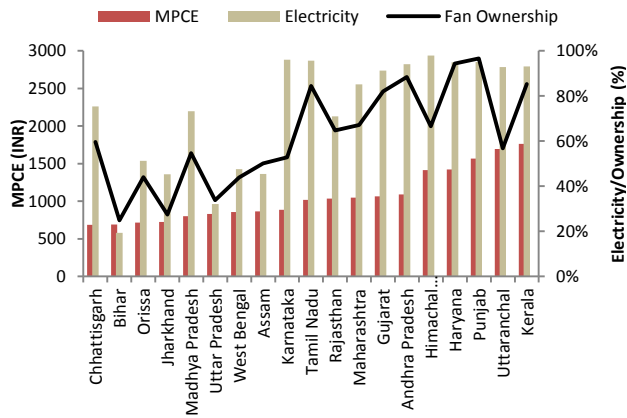


Figure 28: Income, access to electricity and fan ownership in rural areas of major states

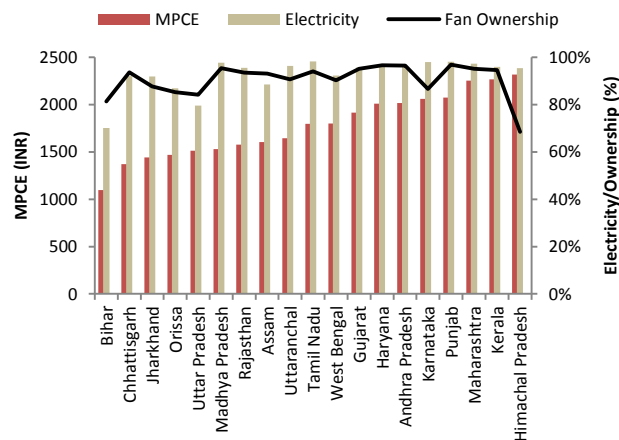


Figure 29: Income, access to electricity and fan ownership in the urban areas of major states

Electricity

Here, we consider the households which use electricity as their primary source of lighting to be the ones which have access to electricity.

- We find that there is a strong correlation between access to electricity and appliance ownership. This is particularly true for fans and televisions which can be considered as appliances of the masses with relatively high levels of penetration. People seem to buy electric fan first followed by a television when they have electricity. As far as refrigerator is concerned people

are likely to own it if they have higher levels of income and reliable supply of electricity³.

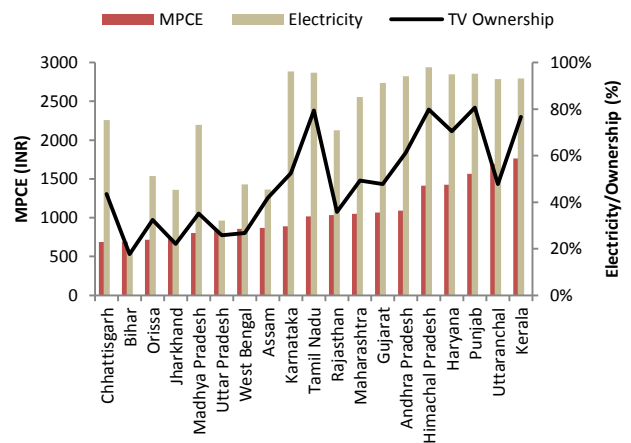


Figure 30: Income, access to electricity and television ownership in rural areas of major states

- Appliance ownership is higher in states which have higher levels of electric supply with similar levels of MPCE. For example, fan ownership is higher in rural Madhya Pradesh than in rural Uttar Pradesh although they have nearly the same MPCE.
- States which saw electrification between the survey periods also saw significant jump in fan and television ownership.

Other factors

There may be several other factors which can influence appliance acquisition. Some of these factors are appliance specific.

- Ownership of fans may also depend on climatic conditions. For example, ownership of fans is lower in Himachal Pradesh (which has a colder climate) compared to states, like Andhra

³ By reliable supply of electricity we mean electricity which is of adequate voltage and is there for a substantial number of hours with fewer power cuts.

Pradesh, Gujarat or Maharashtra, whose MPCE is lower than the MPCE of Himachal Pradesh.

- One of the reasons of high ownership of televisions in Tamil Nadu and huge jump in ownership between the two surveys can be due to free distribution of televisions by a political party during the state assembly elections in 2006.

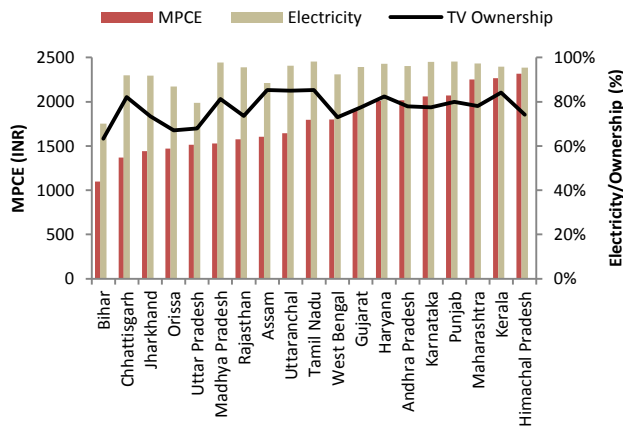


Figure 31: Income, access to electricity and television ownership urban areas of major states

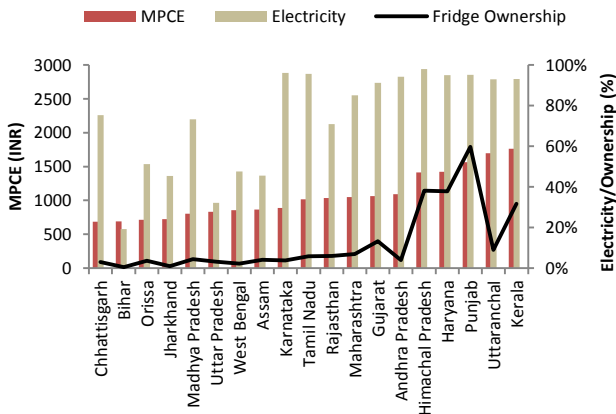


Figure 32: Income, access to electricity and refrigerator ownership in rural areas of major states

- There may be other factors which influence appliance ownership like

household ownership, size of the family, terrain, good sales and service, banking services and consumer friendly schemes. More defined research is required to identify the various factors that influence appliance ownership and acquisition.

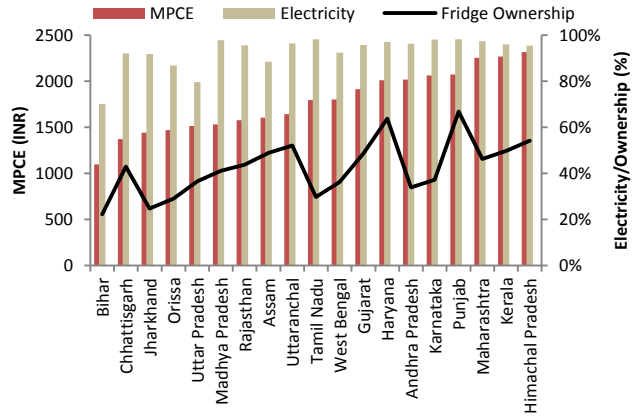


Figure 33: Income, access to electricity and refrigerator ownership in urban areas of major states

6. Saturation potential of appliances

By saturation potential we mean the total number of households who are yet to own appliances. As seen earlier, income and electricity are the major drivers in appliances acquisition. Especially, fans and televisions are the primary appliances which people acquire once they have access to electricity. Refrigerator is still a luxury item which is heavily dependent on income and reliable supply of electricity.

Figures 34-36 show the saturation potential of fans, televisions and refrigerators respectively in the major states. The bars in the figures have three colour shades: dark, medium dark and light. The light and medium dark portions together show the total saturation potential of an appliance. Medium dark portion shows the households which have access to electricity but still has no appliance and the light portion shows the households that do not have access

to electricity and have no appliance. The portion with the darkest shade shows households which have electricity and own appliances.

It can be seen that in states, like Uttar Pradesh, Bihar and West Bengal significant number of households do not have access to electricity.

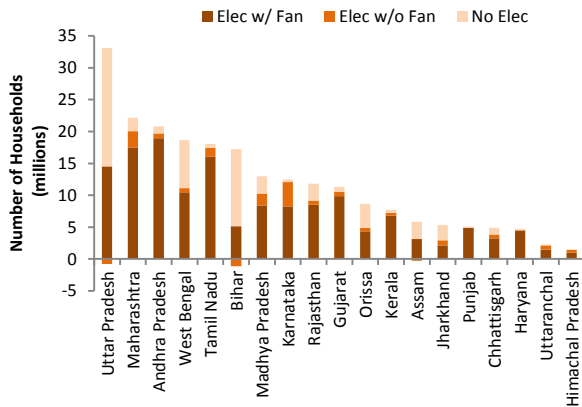


Figure 34: Saturation potential of fans in major states in 2009-10

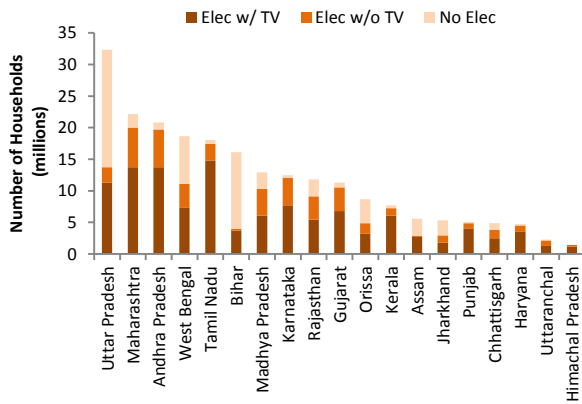


Figure 35: Saturation potential of televisions in major states in 2009-10

So, there is huge potential for saturation of fans and televisions in these states. With the government aggressively pushing electrification schemes like *Rajiv Gandhi Grameen Viduytikaran Yojana* (RGGVY) all these states are going to be completely electrified in near future. So, there is a case for aggressive push

for policies and programs promoting energy efficient fans and televisions in these states. Interestingly, we also find that a significant number of households in Uttar Pradesh and Bihar possess fans but do not have access to electricity. It would be worthwhile to look into the matter.

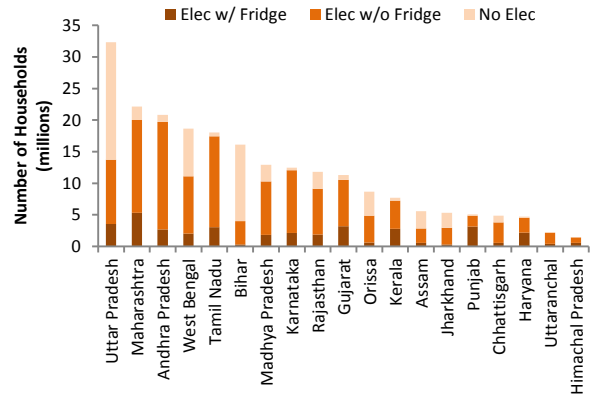


Figure 36: Saturation potential of refrigerators in major states in 2009-10

7. Concluding remarks

In this paper we used two rounds of NSSO household expenditure surveys to analyze ownership patterns and distribution of fans, televisions and refrigerators in India. In particular we found:

- Urban areas are nearly saturated with fans with televisions closely following on its heels. In rural areas, fan and television ownership rapidly increased but still there is lot to catch up.
- Refrigerator is still a luxury item and only richer households own them and that too in the urban areas. In the rural areas the ownership of refrigerators is very low.
- Income and electricity are the major determinants of appliances acquisition. Fans and televisions are the primary appliances which people acquire once

they have access to electricity. Refrigerator is heavily dependent on income and reliable supply of electricity.

The findings of this study can help to identify households and regions that can be effectively targeted by energy efficiency programs. Customized Demand Side Management (DSM) programs targeted at specific income households can be designed using the knowledge from this study.

Acknowledgements

We would like to thank our colleagues at Prayas Energy Group for useful discussions and valuable suggestions while drafting the paper. However, any errors that remain are ours.

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