

Description of Methodology

BARC India

September 2020

Version 1

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1. Sampling and Recruitment

1.1. Sample Universe

BARC India's (BARC's) various measurement products covers distinct sample universes. A sample universe is the target population in which the various audience estimates are projected to, and hence, represent.

1.1.1. Currency Panel Sample Universe

The sample universe for BARC's currency electronic measurement panel (CP) consists of persons two years of age and older residing in television households in all parts of India except certain geographies that are unreachable due to harsh terrain, distance, or political unrest and safety concerns. These uncovered areas include Andaman & Nicobar Islands, Lakshadweep, Kashmir Valley, Kargil, Ladakh, and Arunachal Pradesh (except Itanagar).

1.1.2. Out-of-Home Panel Sample Universe

BARC's sample universe for BARC's out-of-home panel (OOHP) consists of all types of eateries in Urban India except for those in malls, clubs, shops, or canteens. The eatery must have at least one working TV set in an area accessible by the patrons and independent seating space for at least 24 patrons.

1.2. Sample Frame

BARC India currently employs two sample frames to support its panels. The first sample frame is a frame of households supporting the CP panel. The second sample frame is a frame of eateries supporting the out-of-home (OOH) measurement product.

1.2.1. Household Sample Frame

The sample frame for BARC's panels is designed to include private households in all parts of India except for those within the uncovered areas of the Sample Universe (see section 1.1.1). Electoral rolls form the basis of BARC's sample frame.

1.2.2. Out-of-Home Panel Sample Frame

The sample frame for eateries is based upon a pre-existing sample frame. This sample frame is a comprehensive listing of all eateries within Urban India. This sample frame was built by combining multiple databases sourced through multiple agencies.

1.3. Sampling Process

BARC employs different sampling processes for its various products. The sampling processes are described in the following sections.

1.3.1. Currency Panel Sampling Process

The BARC CP is recruited in a two-stage process. The first stage consists of the Broadcast India (BI) Establishment Survey (ES). This is a large-scale face-to-face survey of a sample of approximately 3 lakh households from the target population. The ES furnishes a list of households (i.e., sampling frame) from which the panel itself is drawn. In the case where there are not sufficient ES records to meet panel recruitment needs, additional households are added to the sampling frame through the process of a listing study (LS).

The second stage of the process is Recruitment. It is in the recruitment stage where the appropriate candidate households are approached to join the panel.

1.3.1.1. Stage One: Establishment Survey and Listing Study

The first step in the sampling process is to *establish* each household in the sample. Each household is asked to complete a in-person survey that collects basic household demographics needed to control the panel such as television ownership, age and sex of household members, languages spoken in the household, mode of signal reception, and other variables. All households that complete the establishment process, except those who are excluded for occupational reasons (see section 1.5), are available for recruitment provided the household has at least one working television set.

The ES is conducted annually with field work occurring over a period of several months.

Between BI surveys, if the current ES does not furnish enough sample to meet panel recruitment needs, additional sample will be generated through a Listing Study. The Listing Study functions in a similar fashion to the ES, but is targeted only at regions where additional sample is needed.

1.3.1.1.1. Sample Selection

The cluster head for ES sample clusters is randomly selected using a systematic random sampling approach from electoral rolls. Using this cluster head, households are selected to form sample clusters of a fixed size (c) for every sampling strata.

1.3.1.1.1.1. Cluster Head Selection

A *1-in-k* systematic sampling selection procedure is used then to choose cluster heads. The household selected by the sampling procedure is thereby the basic household. Should the basic household not be found, or refuses to participate, an alternate household is selected. The first two alternate households are the immediately prior and latter households (i.e., k_{-1} , k_{+1}) from the electoral role. The third alternate household is the household immediately on the right from the closest intersection to households k_{-1} , k , and k_{+1} . Subsequent alternate households are obtained using the next household on the right until a successful complete is obtained – forming the cluster head.

1.3.1.1.1.2. Subsequent Cluster Home Selection

Subsequent cluster homes are selected based upon the initially completed cluster head, be it a basic or alternate cluster head. From this initial household, subsequent households are selected using a right-hand-rule with a pre-determined skipping pattern.

1.3.1.1.2. Sample Target

The total sample target for BI is set at 3,00,000 households and is set for two dimensions: Urban/Rural and Hindi Speaking Markets (HSM)/South (Table 1). The Urban/Rural split is based on market needs and determined by BARC’s Technical Committee (TechComm). The HSM/South split is based on the current Universe Estimates (UEs).

Table 1
BI target sample splits

		Region		Total
		HSM	South	
Region Type	Urban	1,49,027	55,502	2,04,529
	Rural	77,026	18,445	95,471
Total		2,26,053	73,947	3,00,000

ES targets are re-assessed prior to every survey and are adjusted accordingly.

Listing Studies have sample targets based on the shortfalls in available sample for recruitment and panel recruitment needs.

1.3.1.2. Stage Two: Recruitment Sample

Recruitment sample is randomly selected from homes that completed the ES or listing study. Sample can be selected from the most recent ES or listing study. Only in exceptional cases will sample be selected from older studies. This is to ensure that the information regarding the household, furnished by the ES or listing study, is as up to date as possible.

To ensure against any convenience sampling on the field, ‘clusters’ (or groups) of eligible HHs are created by BARC based on panel control variables. All households in a single cluster are equally eligible to be recruited, and any single household is representative of the relevant cell that the cluster aims to fill. IDs of these HHs are fed into a central ID Master, which uploads the address and other relevant details of the household, along with a priority, to the mobile tablets used by assigned field executives. The field executives are expected to approach only the HHs which are in the cluster, and convince them to join the panel. Once one household in a cluster agrees to be a panelist, the remaining un-attempted households move back into the main pool for future use, and households that are rejected / refused to be a panelist are churned out of the database.

1.3.1.2.1. Panel Target

The current panel target is 44,000 households¹. The panel target is set for two dimensions: Urban/Rural and HSM/South (Table 2). The Urban/Rural split is based on market needs and is determined by BARC’s TechComm. The HSM/South split is based on the current UEs.

¹ This target will be increased to 55,000 households in 2021.

Table 2
Panel splits

		<u>Region</u>		<u>Total</u>
		<u>HSM</u>	<u>South</u>	
Region Type	Urban	65%	56%	62%
	Rural	35%	44%	38%
Total		65%	35%	100%

1.3.1.3. Recruitment Process

The field recruiter goes to the household sample location assigned by BARC India Measurement Science, explains the purpose of the BARC India TV Measurement Service and then seeks consent from the chief wage earner and householder for registering with BARC India. If the household is eligible (i.e. no disqualifications basis media/research affiliations of household members, adequate GSM wireless signal strength, agreement to incentives provided by BARC India, confirmation of compliance) the field recruiter asks the householder to provide specific household and household member information via a standardized panel recruiting questionnaire administered by the recruiter using a computer tablet app. Presently, fieldwork for panel recruitment and ongoing maintenance is handled by MDL as well as three independent agencies, hereinafter called the Panel Management Agency (PMA) recruited by MDL.

An integrated “Panel Management Software (PMS)” links the mobile tablet that the field executives carry to the server, thereby enabling capture and transfer of panel household details via the wireless cellular network directly to BARC India’s central office server. Automated validation checks in-built in the PMS enable many quality control checks to ensure panel health. This provides BARC India with a fully automated data collection process for use at all stages of the panel household relationship.

Strict confidentiality is maintained at all steps of the panel recruitment, training and maintenance process. Ongoing hygiene checks are performed on PMA fieldwork by BARC India and its Design and Quality Control partners.

1.3.1.4. Panel Maintenance

The viewing behaviour of panel homes is reported to BARC India daily. The BARC India validation process analyzes household and individual viewership behaviors, highlighting behaviors considered to be outliers (at individual/household level). Based upon validation results, Measurement Science asks the PMA to perform coincidental checks on these homes either telephonically or physically. Certain suspicious outliers are also checked directly by BARC India – bypassing the PMA. BARC India also involves a separate vigilance agency to check on outliers that it considers highly suspicious. Non-compliance is categorised as a behavioural issue of the household or a technical issue with the meter. Any discrepancy in information is noted at this stage. If it is a behavioural issue, the household is then re-trained. If non-compliance continues, then the panel home is dropped. If there is a technical issue with the meter, then the issue is resolved by the BARC India field and technical teams. Where needed, technical issues are raised with meter technology providers.

Panelist training and compliance maintenance are priority issues for the PMA. Pursuant to BARC India policy, those households that exhibit substandard compliance, when compared to BARC India standards, are retrained. If, after retraining, a household continues to underperform, it will be churned out of the panel.

The training protocol specifies two post installation training visits. The first visit is generally made 3-5 days post installation and includes training household members in persons viewing button pressing, observing the working condition of equipment, verifying that the user manual is provided and available for use, etc. The second visit, generally made 10-12 days post installation, includes coincidental checks – whether TV is ON or OFF, channel viewed and persons viewing with retraining as needed in button pressing and confirming that the family member button assignments are correct. The PMS application also has a pre-loaded training module for this purpose.

To ensure up-to-date and correct household data as well as for periodic re-training, the Field SOP mandates a complete demographic check every six months of each panel household of all key variables.

1.3.1.5. Replacement Sample

Recruitment of homes to the panel is done on a regular basis. Recruitment is required to replace homes that have been removed from the panel. Homes are removed for a variety of reasons, from members' non-compliance to household's request. In order to maintain panel balance, homes selected for replacement sample are matched as closely to the current needs of the panel (see section 2.5 for control strata). Depending on the needs of the panel at the time of recruitment, homes selected for recruitment may not match the homes which were dropped from the panel.

1.3.2. Out-of-Home Panel Sampling Process

1.3.2.1. Out-of-Home Universe Estimate Study Sampling Process

1.3.2.1.1. Sample Selection

Based on UEs a sample requirement grid is prepared at the State Group X Town Class X NCCS X Age X Sex level monthly. Within each Towns Class, all towns with a population of 20 lakh or more are covered and a sample of the remaining smaller towns is selected using systematic random sampling. The sample target is then distributed amongst all the identified pin-codes within the selected towns.

A starting point is identified for each pin-code. Starting points can be one of many recognizable landmarks such as, but not limited to, schools, places of worship, or police stations. Households immediately on the right of the starting point are approached for an interview. Following a successful interview, a skip pattern of every sixth household is used.

1.3.2.1.2. Sample Target

There is a monthly sample target of 4,000 individuals.

1.3.2.2. Establishment Sampling Process

The BARC Establishment panel is recruited in a single stage process.

1.3.2.2.1. Sample Selection

In order to draw a probability sample a sampling frame – which is a complete list of statistical units covering the target population – is required. BARC India used a pre-existing sampling frame for drawing sample. This sampling frame was a comprehensive list of all eateries along multiple variables such as state, Town Class, Restaurant type, TV availability, Town Name, Pin-code. The frame was built by combining multiple databases of eateries sourced through multiple agencies. The most exhaustive database at city level was used as the primary database and data from the other databases were added creating the larger detailed database of eateries.

Statistical stratification was conducted in the allocation of sample, ensuring proper representation. Stratification was across the following variables:

- State Group;
- Town Class;
- Restaurant type; and
- Pin-code.

In order to prevent convenience sampling occurring on the field, ‘clusters’ (or groups) of eligible eateries were created based on panel control variables such as type of eatery and pin-code. All eateries in a single cluster are equally eligible to be recruited, and any single eatery is representative of the relevant cell that the cluster aims to fill.

1.3.2.2.2. Sample Target

The OOH panel comprises of 1,050 eateries. All towns with a population greater than 20 Lakhs were included in the OOH Panel. The remaining medium and small size towns were selected using systematic random sampling. Population Proportionate Sampling (PPS) was then used for sample allocation amongst the remaining towns.

1.3.2.2.3. Recruitment Process

Using the location assigned by BARC India, a field recruiter visits the eatery and explains the purpose of the BARC India OOH TV Measurement Service and seeks consent from the Manager / Owner of the eatery for participation. If the eatery is eligible (i.e., name of eatery is correct, type of eatery is matching and the owned TV sets are in working condition), the field recruiter collects specific information for the eatery such as operating hours, seating capacity followed by other recruitment information. The recruitment questionnaire is administered via a mobile phone or tablet. All fieldwork for the OOH panel is managed by Meterology Data Ltd. (MDL) and their sub-contracted panel management agencies (PMA).

An integrated “Panel Management Software” (PMS) links the mobile tablet that the field executives carry to the server, thereby enabling capture and transfer of OOH panel details via the wireless cellular network directly to BARC India’s central office server. Automated validation checks in-built in the PMS

enable many quality control checks to ensure OOH panel health. This provides BARC India with a fully automated data collection process for use at all stages of the OOH panel relationship.

1.3.2.2.4. Footfall Measurement

Footfall measurement is necessary in order to report daily reach and impressions. Footfall is measured in almost 200+ eateries across multiple cities and mapped to the viewership of 1,050 eateries.

Eatery footfall is measured manually using a first-in/first-out (FIFO) technique. Footfall is measured in-person using a device in which the ticker APP is installed. This process then captures individuals going in or out of the unit. This approach is the most common and reliable type of footfall measurement allowing for accurate footfall analytics. Footfall measured and analyzed in this way are very rich in terms of the data provided (people counts, dwell times, movement, heat maps, time between visits and more).

Footfall was captured throughout the operating hours of the eateries across the week within each State group X Town Class. Details captured were as follows

- Count of patrons entering and exiting;
- Sex of each patron; and
- In-time and out time of patrons.

A schedule of eateries is prepared for everyday of the month thereby allowing for the rotation of measured eateries – ensuring adequate spread of the eateries throughout the year.

Unbiased Validation rules and Quality checks were set-up to ensure there are adequate footfalls being captured from data.

1.3.2.2.5. Replacement Sample

Recruitment of establishments to the panel is done on a regular basis. Recruitment is required to replace establishments that have been removed from the panel. Establishments are typically removed due to a request from the establishment. In order to maintain panel balance, establishments selected for replacement sample are matched as closely to the current needs of the panel (see section 2.5 for control strata). Depending on the needs of the panel at the time of recruitment, establishments selected for recruitment may not match the establishment which were dropped from the panel.

1.4. Panel Turnover and De-Installation

In line with the Ministry of Information and Broadcasting's (MIB's) Policy Guidelines for Television Rating Agencies in India, BARC employs a forced churn policy for the CP. 25% of the panel households are rotated every year. This rotation is in such a manner that older panel homes are removed first while maintaining the representativeness of the panel. The rotation is conducted in a staggered manner by rotating panel homes every month.

Establishments do not fall under the MIB's guidelines.

Establishments household become eligible for selective discard after their fourth anniversary on the panel with a maximum time-in-sample of seven years.

1.5. Household Members Ineligible to Participate

All household members, 2 years of age or older, are recruited to participate in the panel. This method maximizes the use of sample and reduces the possible bias that may arise from using age/sex quotas. Additionally, participation in the panel is facilitated when all household members are involved.

Households with members employed by broadcasters, advertisers, broadcast distributors, media affiliates, or market research are ineligible to participate.

2. Sample Weighting

Sample weighting is a technique used to compensate for disproportionate representation of specific population groups in the in-tab sample. This approach guarantees the data will properly replicate the behavior of the population they represent.

Two conditions must be present for sample weighting to be used:

- a. Specific population groups are disproportionately represented in the sample; and
- b. The behavior that is measured is likely to be different for those specific population groups.

2.1. Cell Weighting

BARC uses a cell weighting technique designed to maximize the reliability of the sample data and minimize any statistical bias. This is achieved by performing the least amount of weighting required to correct for sample disproportionalities that may distort the estimates of the audience.

Cell weighting uses the interlaced cell universes across all weighting classes. Weights for all individuals or households within an interlaced weighting class are computed separately. For each interlaced weighting class, there is a universe estimates, which means that there is one population estimate for each interlaced weighting class. The sample is then weighted to the universe estimate by dividing the population estimate (N_i) by the sample count (n_i). Each individual, or household, within the same interlaced weighting class therefore carries the same weight.

$$w_i = \frac{N_i}{n_i}$$

The cell weighting technique will not produce reliable results if a weighting class is empty or if it falls well below the target in-tab for that weighting class. In cases where the number of respondents in one or more weighting classes is well below the target in-tab, weighting classes may be collapsed into a new single weighting class. For example, the weighting classes of NCCS C and NCCS D or E4 may be collapsed into a new weighting class of NCCS C, D, or E, in order to produce reliable weighted in-tabs.

The panel is weighted separately for household and individual level ratings with each level carrying its own set of weighting variables.

2.1.1. Currency Panel Weighting

BARC's CP is weighted at two levels: individual and household.

2.1.1.1. Currency Panel Individual Level Weighting

The sample in BARC's CP measurement service is weighted on five variables at the individual level, each with two or more weighting classes:

1. State group (Table 3);
2. Town class (Table 4);
3. New consumer classification system (NCCS) (Table 5);
4. Sex (

5. Table 6); and
6. Age Group (Table 7).

Table 3

<i>CP individual state group weighting classes</i>		
• Bihar – Jharkhand	• Kerala	• West Bengal
• Andhra Pradesh – Telangana	• Madhya Pradesh – Chhattisgarh	• Uttar Pradesh – Uttarakhand
• Delhi Sales region	• Maharashtra – Goa	• North East-Sikkim ³
• Gujarat - DNH ²	• Odisha	• Rajasthan
• Karnataka	• Tamil Nadu - Puducherry	• Punjab – Chandigarh
		• Haryana – Himachal Pradesh – Jammu & Kashmir ⁴

Table 4

<i>CP individual town class weighting classes</i>
• Urban 75 lakh and above
• Urban 10 to 75 lakh
• Urban 1 to 10 lakh
• Urban below 1 lakh
• Rural

Table 5

<i>CP individual NCCS weighting classes</i>
• NCCS A
• NCCS B
• NCCS C, D, or E

² Includes the Union Territories of Daman and Diu, and Dadra and Nagar Haveli.

³ Includes the States of Sikkim, Arunachal Pradesh, Assam, Meghalaya, Nagaland, Manipur, Tripura and Mizoram.

⁴ Includes Jammu region from UT Jammu & Kashmir.

Table 6

CP individual sex weighting classes

-
- Male
 - Female
-

Table 7

CP individual age group weighting classes

-
- 2 to 21 years of age
 - 22 years of age or older
-

2.1.1.2. Currency Panel Household Level Weighting

The sample in BARC’s CP measurement service is weighted on three variables at the household level, each with two or more weighting classes:

1. State group (Table 8);
2. Town class (Table 9); and
3. NCCS (Table 10).

Table 8

CP household state group weighting classes

-
- | | | |
|---|---|---|
| <ul style="list-style-type: none"> • Bihar – Jharkhand • Andhra Pradesh – Telangana • Delhi Sales region • Gujarat - DNH⁵ • Karnataka | <ul style="list-style-type: none"> • Kerala • Madhya Pradesh – Chhattisgarh • Maharashtra – Goa • Odisha • Tamil Nadu - Puducherry | <ul style="list-style-type: none"> • West Bengal • Uttar Pradesh – Uttarakhand • North East⁶ - Sikkim • Rajasthan • Punjab – Chandigarh • Haryana – Himachal Pradesh – Jammu & Kashmir⁷ |
|---|---|---|
-

Table 9

CP household town class weighting classes

-
- Urban 75 lakh and above
 - Urban 10 to 75 lakh
 - Urban 1 to 10 lakh
 - Urban below 1 lakh
 - Rural
-

⁵ Includes the Union Territories of Daman and Diu, and Dadra and Nagar Haveli.

⁶ Includes the States of Sikkim, Arunachal Pradesh, Assam, Meghalaya, Nagaland, Manipur, Tripura and Mizoram.

⁷ Includes Jammu region from UT Jammu & Kashmir.

Table 10

CP household NCCS weighting classes

<ul style="list-style-type: none"> • NCCS A • NCCS B • NCCS C, D, or E

2.2. Minimum and Maximum Weights

In order to ensure that the Sum of Weights matches the Universe of the weighting strata, BARC does not employ the concept of minimum or maximum weights.

2.3. Collapsing

If the sample size in a particular weighting cell is too small, erratic results can occur during cell weighting. Therefore, prior to the weighting algorithm starting, BARC passes the sample counts through a ‘cell collapse’ check. If a weighting does not pass the check, it will be joined with another weighting cell in order to ensure an adequate sample size. The ‘cell collapse’ check is based upon a pre-determined minimum sample count.

2.4. Types of Weights

In BARC’s panels, there is only one basic weight type: Daily. The data for each day is weighted separately and then combined at the individual level.

2.5. Sample Control Configurations

For the CP, BARC balances the recruited sample to one set of independent population estimates. Since entire households are recruited, balancing occurs at the household level. Panels are balanced against a set of Primary and Secondary Control variables. Maintaining the balance of Primary variables takes precedence over Secondary variables. These variables have been selected as they have been shown to have the most impact on the variability of television audience estimates.

The primary control variables (strata) for the CP are state group, town class, and NCCS. The secondary control variables for the CP are household size, languages spoken and home + language most often spoken at home, education of the highest educated individuals in the household and mode of signal reception (MOSR).

The OOHP is controlled basis state group, town class, restaurant type, and pin-code.

2.5.1. Primary Control Variables

2.5.1.1. State Group

The state group demos in which BARC balances the panels all of its panels on are as follows (Table 11). *Note.* This control strata is not applicable for Establishments.

Table 11

State group control strata

• Bihar – Jharkhand	• Kerala	• West Bengal
• Andhra Pradesh – Telangana	• Madhya Pradesh – Chhattisgarh	• Uttar Pradesh – Uttarakhand
• Delhi NCR	• Maharashtra – Goa	• North East ³
• Gujarat – DNH ²	• Odisha	• Rajasthan
• Karnataka	• Tamil Nadu – Puducherry	• North ⁴

2.5.1.2. Town Class

The town class demos in which BARC balances the panels on are as follows (Table 12).

Table 12

<u>Currency Panel</u>	<u>Establishments</u>
• Urban 75 lakh and above	• Urban 75 lakh and above
• Urban 10 to 75 lakh	• Urban 10 to 75 lakh
• Urban 1 to 10 lakh	• Urban 1 to 10 lakh
• Urban below 1 lakh	• Urban below 1 lakh
• Rural	

2.5.1.3. NCCS

The NCCS demos in which BARC balances the panels on are as follows (Table 13). *Note.* This control strata is only applicable to the CP.

Table 13

NCCS control strata

• NCCS A
• NCCS B
• NCCS C
• NCCS D or E

2.5.1.4. Restaurant Type

The restaurant types in which BARC balances the panels on are as follows (Table 14). *Note.* This control strata is only applicable for the Establishment panel.

Table 14

Restaurant type control strata

• Dhaba
• Restaurant with bar
• Restaurant without bar

2.5.1.5. Pin-code

Sample targets in all sampled towns are stratified proportionately across all known pin-codes to avoid cluttering of establishments.

2.5.2. Secondary Control Variables - CP

Secondary control variables are only applicable to BARC's CP. There are no secondary control variables used in PV or for selection of establishments.

2.5.2.1. Household Size

The household size demos in which BARC balances the CP panel on are as follows (Table 15).

Table 15

Household size control strata

<u>Household size</u>	<u>Number of members</u>
Small	1 to 2 members
Medium	3 to 4 members
Large	5 or more members

2.5.2.2. Languages Spoken at Home + Language Most Often Spoken at Home

This control variable is an interlace between the languages spoken (LSOH) at home and the language most often spoken at home (LMOS). The specific levels vary for each state group by townclass and are based upon the local languages and propensity for other languages. For example, the levels can be as simple as three languages as in the case of rural towns with a population of 2 to 5 lakh in Kerala (Table 16) or can be as complicated as seven in the case of Mumbai Sales Region (Table 17).

Table 16

LMOS + LMOS control strata for rural towns with a population of 2 to 5 lakh in Kerala

<ul style="list-style-type: none"> Languages spoken at home do not include English and language most often spoken is Malayalam Languages spoken at home do not include English and language most often spoken is not Malayalam Languages spoken at home includes English

Table 17

LMOS + LMOS control strata for rural towns with a population of 2 to 5 lakh in Kerala

<ul style="list-style-type: none"> Languages spoken at home do not include English and language most often spoken is either Hindi or Bhojpuri Languages spoken at home do not include English and language most often spoken is Marathi Languages spoken at home do not include English and language most often spoken is Gujurati Languages spoken at home do not include English and language most often spoken is not Hindi, Bhojpuri, Marathi, or Gujurati Languages spoken at home includes English and language most often spoken is Marathi or Hindi Languages spoken at home includes English and language most often spoken is Gujurati or English Languages spoken at home includes English and language most often spoken is not Marathi, Hindi, Gujurati, or English

2.5.2.3. Education of the Highest Educated Individual in the Household

The education of the highest educated individual in the household demos in which BARC balances the CP panel on are as follows (Table 18).

Table 18

Education of highest educated individual in the household control strata

- Up to 9th standard
 - SSC/HSC, some college but not graduate
 - Graduate+
-

2.5.2.4. Mode of Signal Reception

The mode of signal reception (MOSR) demos in which BARC balances the CP panel on are as follows (Table 19).

Table 19

Mode of signal reception control strata

- Cable
 - Direct to Home (DTH)⁸
-

2.6. Universe Estimates (Weighting and Control)

All UEs are updated with the every release of a new BI study.

⁸ This includes both free connections (i.e., Freedish) and paid connections.

3. Panel Size and Design

3.1. CP Panel Size and Design

3.1.1. CP Panel Size

BARC’s CP panel size is mandated by the Ministry of Information and Broadcasting’s (MIBs) Policy Guidelines for Television Rating Agencies in India. The panel size is currently 40,000 households with a planned expansion to 50,000 households in the 2021 calendar year. As per the MIBs guidelines, an over-installation of 10% is required, thereby requiring the 40,000 household panel to effectively be contained within an installed base of 44,000 households.

3.1.2. CP Panel Design

The initial panel of 22,000 HHs was allocated per state group/metro based on RE concept. RE or the “Relative Error” concept is a type of statistical sampling error described as the deviation in percentage of the observed value from the actual/expected value from the selected sample. As the sample size is increasing (currently at 44,000 HHs), REs are naturally reducing. For the increased sample, BARC has also considered improved weighting efficiencies for designing the panel (Lesser difference between individual with lowest weight and individual with lowest weight = Higher Weighting Efficiency).

All cities with a population above 5 lakhs as per Census 2011 are selected individually (except for Srinagar). Sample allocations for all other town classes within a State are based on the town-class group which is further allocated to PPS (Population Proportionate Sampling) among TV owning Households. Selection of actual Towns /Villages was performed by means of systematic random sampling after arranging available Towns / Villages in descending order basis their TV owning household populations.

The panel is statistically representative of the entire country.

3.1.2.1. Oversampling in the CP Panel Design

In order to ensure the usability of the BARC CP data a minimum sample target of 180 households is maintained for each weighting strata. Additionally, due to the heterogeneity of viewing and other market dynamics, BARC oversamples megacities and urban India (Table 20).

Table 20
Universe and sample proportions by regions

Region	Total Universe	TV Universe	Sample Design
Megacities	8%	11%	17%
Urban India less megacities	26%	34%	45%
Rural India	66%	55%	38%

3.2. Establishment Panel Size and Design

3.2.1. Establishment Panel Size

BARC’s Establishment panel has a total sample size of 1,050 eateries.

3.2.2. Establishment Panel Design

All towns with a population greater than 20 Lakhs were included in the OOH Panel. The remaining medium and small size towns were selected using systematic random sampling. Population Proportionate Sampling (PPS) was then used for sample allocation amongst the remaining towns.

4. Data Processing

BARC employs two primary data processing steps: pre-processing and validation.

4.1. Pre-processing

The data from the collection server is first pre-processed, where errors and inconsistencies that may creep in due to technical issues are cleaned up. In this state, attribution rules are applied.

Data collected from the meters is in seconds. However, in keeping with international standards, all validations rules are on viewing sessions (blocks of time of TV Set on in the HH – Tuning; and of each individual viewing TV - Viewing) and reported data is in clock minutes. Hence, all data needs to be converted to clock minutes (i.e. HH:MM format, e.g. 12:00:00 to 12:01:00, 12:01:00 to 12:02:00 and so on).

Attribution rules are applied on the statement file at the pre-validation stage, i.e. after the data is received from collection servers for production processing and validation.

There are five conditions under which viewing behaviour is to be attributed:

1. TV set session;
2. Magnetisation;
3. Bridging;
4. Individual viewing sessions within a clock minute; and
5. Channel viewing sessions within a clock minute.

4.1.1. TV Set Session

BARC attributed viewing to the minute. If a TV set is on for 30 seconds or more in a clock minute, it is attributed as being on for the entire clock minute. In the BAR-O-Meter measurement system TV On and Off status is determined by the presence or absence of a watermarked channel. Since viewership of non-watermarked channels is not captured by the BAR-O-Meter, any viewing of non-watermarked channels is considered as TV Off.

4.1.2. Magnetisation

There is generally a gap between the time viewers switch on the TV set, move to the channel intended to be viewed, and press their viewing buttons on the BARC India remote. Unless removed, this gap would depress viewing by the duration from the time the TV is switched on and the individual button is pressed. A Magnetisation algorithm is applied in such cases and viewership of these individuals is 'magnetised' or linked back to the time when the first watermarked channel was started to be viewed.

4.1.3. Bridging

Bridging applies only to TV sets measured with BAR-O-Meters for use when people put the TV set on mute for short durations (i.e., 3 minutes). Unless this gap is 'bridged', it would be considered as TV off and the time spent viewing during the gap would not be captured. In order to include the gap as viewing

time a bridging algorithm is applied when no watermark is present in between two watermarked channels for a certain maximum duration. For bridging, the following rules are applied on the TV set:

- In case the channel before and after the non-watermarked duration is the same, viewing duration of the non-watermarked period is attributed entirely to this channel
- In case the channels before and after the non-watermarked duration are different, viewing duration of the non-watermarked period is attributed alternately to the earlier and later channel, i.e. the viewing is attributed to the channel being viewed before the non-watermarked duration in the first, third, fifth (and so on) instances observed in the system; and the viewing is attributed to the channel being viewed after the non-watermarked duration in the second, fourth, sixth (and so on) instances observed in the system

4.1.4. Individual Viewing Sessions within a Clock Minute

There are rules applied to the second by second events that attribute viewing to one and only one TV channel for an entire clock minute. In each systems only one channel is eligible to receive viewing credit for each clock minute throughout the viewing day. if an individual is viewing a TV channel for 30 seconds or more in a clock minute, the rules are straightforward and viewing is attributed to that channel for the entire clock minute.

The rules become more complex when viewing during a clock minute involves multiple channels for a total of 30 or more seconds additional rules are required as described below for processing BAR-O-Meter event data.

4.1.5. Channel Viewing Sessions within a Clock Minute

Individuals can view multiple channels within a single clock minute. However, only one channel will be assigned the viewing in each clock minute. To assign this viewing, the following rules are applied.

4.1.5.1. Only One Channel Watched

The viewing for the entire clock minute gets attributed to that channel.

4.1.5.2. Multiple Channels Watched with Different Viewing Durations

Viewing is attributed to the channel with the maximum viewing duration.

4.1.5.3. Multiple Channels Watched with Two or More Channels Having the Same Maximum Viewing Duration

There are two scenarios for this rule:

- Scenario A – one of the channels with the maximum viewing duration moves into the next clock minute. In this case, viewing is attributed to the channel moving into the next clock minute; and
- Scenario B – none of the channels with the maximum viewing duration moves into the next clock minute. In this case, viewing is attributed to a random channel from among those channels having the maximum viewing duration, using a random allotment algorithm.

It is pertinent to note that the 30 seconds or more rule, wherever applied, refers to a total of 30 seconds in a clock minute – whether consecutive or not.

4.2. Data Validation

Validation of viewership data is a daily process performed at three levels. The first is the identification and treatment of landing page activities, the second is the identification of statistical outliers, and the third is against channels that have been confirmed as having attempted tampering of panel households following a rigorous process of Vigilance investigations and raw data analyses by Data Scientists. These data validation procedures consist of documented and strictly controlled rules applied in a transparent and systematic manner during daily production processing.

Validation rules and their application are subjected to external audit and ongoing review by the BARC Oversight Committee, but not otherwise disclosed to prevent individuals who might attempt to tamper with panel HHs from gaining valuable insights.

4.3. Modelling and Fusion (Out-of-Home Estimates Only)

BARC measures in-home (IH) and OOH television viewing of individuals who reside in a household with at least one TV. Therefore, in order to correctly attribute OOH viewing to the BARC TV panel, the proportion of OOH viewing coming from individuals residing in TV households needs to be estimated. This step is done through a multi-stage modelling system. This system not only allowed for an understanding of the proportion of OOH viewing which should be attributed to the panel, but also, the correct individuals in the panel which could be eligible to receive OOH viewing.

In order to identify eligible panel individuals for OOH viewing a survey was conducted amongst members of TV panel from Urban India. The goal of the survey was to gauge the incidence and behavior of these individuals for:

- a) Likelihood of visiting eateries on daily basis;
- b) Preferred days of visiting eateries;
- c) Frequency of visiting eateries;
- d) Last visit at an eatery; and
- e) Type of eateries visited.

Using the data collected from survey a likelihood (i.e., probability score) was computed for each individual visiting eateries from TV panel. Higher the score for the day, higher was opportunity for individual to be the most probable individual to receive OOH viewership.

4.3.1. Algorithm

Multi-stage data modelling techniques were adopted to produce TV+OOH Viewership results in BMW. There were 5 different models used.

4.3.1.1. Footfall extrapolation

Despite OOH viewership being measured in 1,050 eateries with roughly 1,500 meters, in any given day, the maximum eateries in which footfall gets measured was measured is 200. Hence, a 5-tier hierarchy approach for attributing footfall from eateries to eateries without footfall was required. This was done in order to find out the best fit eatery to map the footfall and viewership. The hierarchy of the approach is as follows:

1. Eatery type;
2. City / town;
3. Town class;
4. Seating capacity; and
5. State group.

When the number of TV sets in an establishment was more than than one, the footfall was divided between TV sets using Bayesian probability. This ensures that all TV sets in the eatery are directly mapped to specific viewership and footfall data.

4.3.1.2. Creating Clusters

Clusters were created using a hierarchical clustering technique for clubbing the viewing sessions at the channel level. The hierarchy was based on the following variables:

1. In-time for patrons;
2. State group;
3. Town class;
4. Sex; and
5. Channel.

Post creating clusters, in-time and out time was averaged using the start- and end-time and number of all individuals appearing in that clusters. A new Cluster was created every 30 minutes ensuring zero duplication of channels within same cluster.

Usable clusters were identified basis top channels by duration in each cluster and the count of individuals from HH TV panel to which OOH Clusters needed to be allocated in TV panel. Details of computing count is covered in last section of Algorithm

4.3.1.3. Attribution of Demographic Variables

The variables captured in the OOH individual UE survey data provided distribution patterns of Age group X NCCS for each genre watched within eateries. This distribution proportion of Age X NCCS for each genre from the study was attributed to OOH clusters at lowest possible level. This allowed for a channel mapping with Age X Sex X NCCS for each usable cluster in each State X Town Class.

4.3.1.4. OOH weighting

The weighting process assigns a weight or factor to each Cell that reflects their proportionate representation of the universe. Sample weighting is a statistical process used to correct for imbalances that may exist within the realized sample. Weighting occurs on a daily basis and assigns OOH individual weights which are then applied to OOH clusters.

Data output from the OOH Monthly rolling UE is used for OOH estimation and weighting purposes. Weighting was done using a cell weighting technique. The variables used for weighting were as follows:

1. Reported state group (16 levels);
2. Reported town class within each state group (up to 3 levels);
3. Reported NCCS (3 levels);
4. Sex (2 levels); and
5. Reported age group (7 levels).

4.3.1.5. Applying OOH Viewership to TV panellist

The count of the individuals from the TV Panel to which OOH clusters have to be applied were computed dividing the “OOH UE weight” by “weighting factor of TV Individual” at the lowest common weighting levels.

Using the probability Scoring system (explained above), the individuals of TV panel were sorted in descending order of Score and best fit procedure was used to ensure OOH clusters were properly allocated. This allocation was accomplished at the State group X Town Class X NCC X Sex X Age group level. This means that only a subset of individuals from TV panel carry TV and OOH viewership data for reporting TV+ OOH Viewership

5. Technical Details

For the capture of TV viewing, BARC uses a TV set metering technology that captures watermarks embedded in the audio transmission of TV channel transmissions to identify the channel being watched.

The BARC BAR-O-Meter captures TV usage, TV station identification, and individual viewing through the use of two digital devices: one installed by the broadcaster (embedder) at the station head end/transmission site(s) and the other – referred to as the BAR-O-Meter – that is installed on each TV set in the panel households.

5.1. Metering Watermark Embedder

Embedder equipment is placed at the Broadcaster’s headend where the Channel signal transmission begins. The device embeds a unique watermarked code in the audio component of the program content workflow. This code consists of the Channel ID & the time stamp. Each channel has its own unique code (or codes, in case the channel has taken a back-up). Once the unique watermark IDs are generated and assigned to each broadcast station cooperating with BARC India, the embedder is installed at the broadcaster’s headend transmission site and a special channel specific electronic card is inserted. The results in the embedder continuously placing a time stamped channel name and watermark ID in the channel’s content workflow. The watermark is an inaudible audio code made available to TV broadcasters that subscribe to and support the BARC India measurement of TV audiences. A master list of TV Channel Watermarked IDs is stored on the BARC server and downloaded to BAR-O-Meters for the identification and measurement of TV Channel viewing.

5.2. Metering Unit

Each meter system consists of a main unit, a display unit and probes that for BAR-O-Meters capture the audio output of the TV set.

Each main unit is equipped with a microprocessor and a modem. The main unit is placed near the TV set being measured in the panel household. Each main unit has a probe attached to it that is either placed near the TV set or connected to the line or audio out of the TV. The probe capture the identity of each tuned TV signal and feeds this information to the main unit where it is time stamped and stored for transmission as viewing events to BARC central site collection servers assigned to BAR-O-Meter measurement systems.

5.2.1. Individual Viewer Identification

The method of individual person’s viewer identification for the BAR-O-Meter is a button pushing remote handheld device. The measurement system provides one handheld remote control unit for each metered TV set. The handheld device has buttons made available for assignment to household members who are asked as part of their panel participation to press their assigned button when they are viewing TV. Each panel household member aged 2 years and older is assigned a button on the remote control handheld unit. Separate buttons on the remote handheld device are reserved for use by guests, entering

their gender and age bracket when viewing TV. *Note.* While it is captured, guest viewing is not considered in the BARC audience estimates.

5.3. Data Capture, Storage, Transmission, and Collection

The TV set metering systems continuously and passively captures TV viewing events in real time, recording the time and duration of channel tuning events and capturing the viewership events of individual members aged 2 years or older that have pressed their viewer ID button to confirm their presence in the audience.

The main unit stores the individual time stamped events in memory for transmission to the BARC server at predetermined intervals throughout the viewing day. The BAR-O-Meter TV viewing event data are then received by BARC collection server where collected TV event data are simultaneously backed up and made available to pre-processing software.

6. Methodological Flow

The following section outlines the methodological flow for the BARC CP and OOH products.

6.1. Methodological Flow for the Currency Panel

The BARC CP follows a methodological flow consisting of twelve distinct steps (Figure 1).

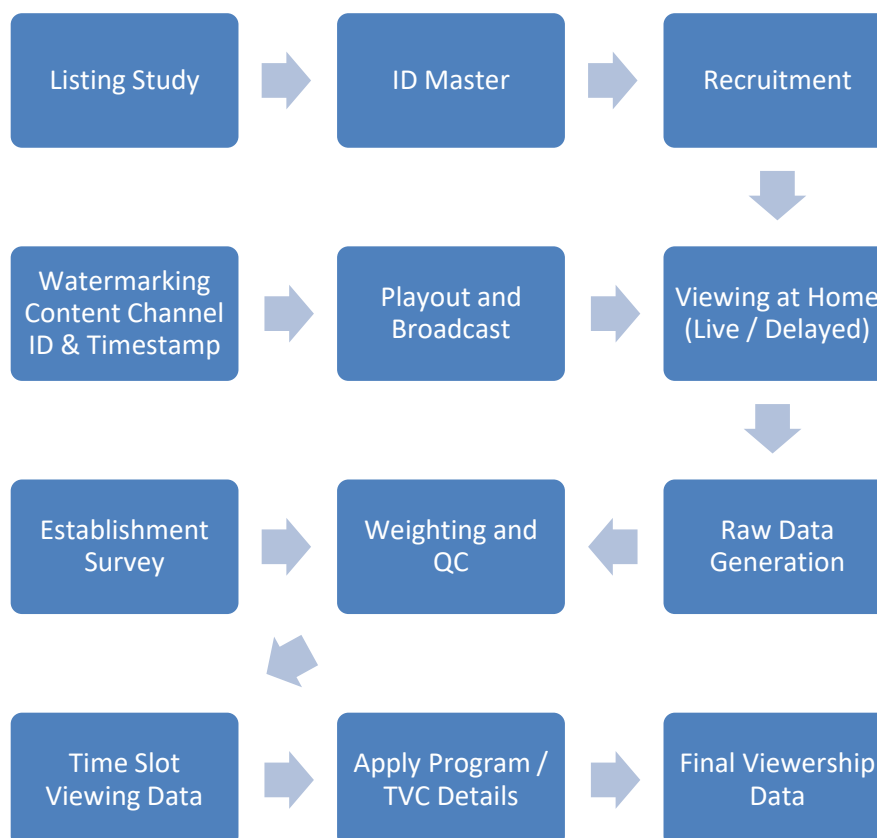


Figure 1. Currency Panel Process Flow

6.2. Methodological Flow for Out-of-Home

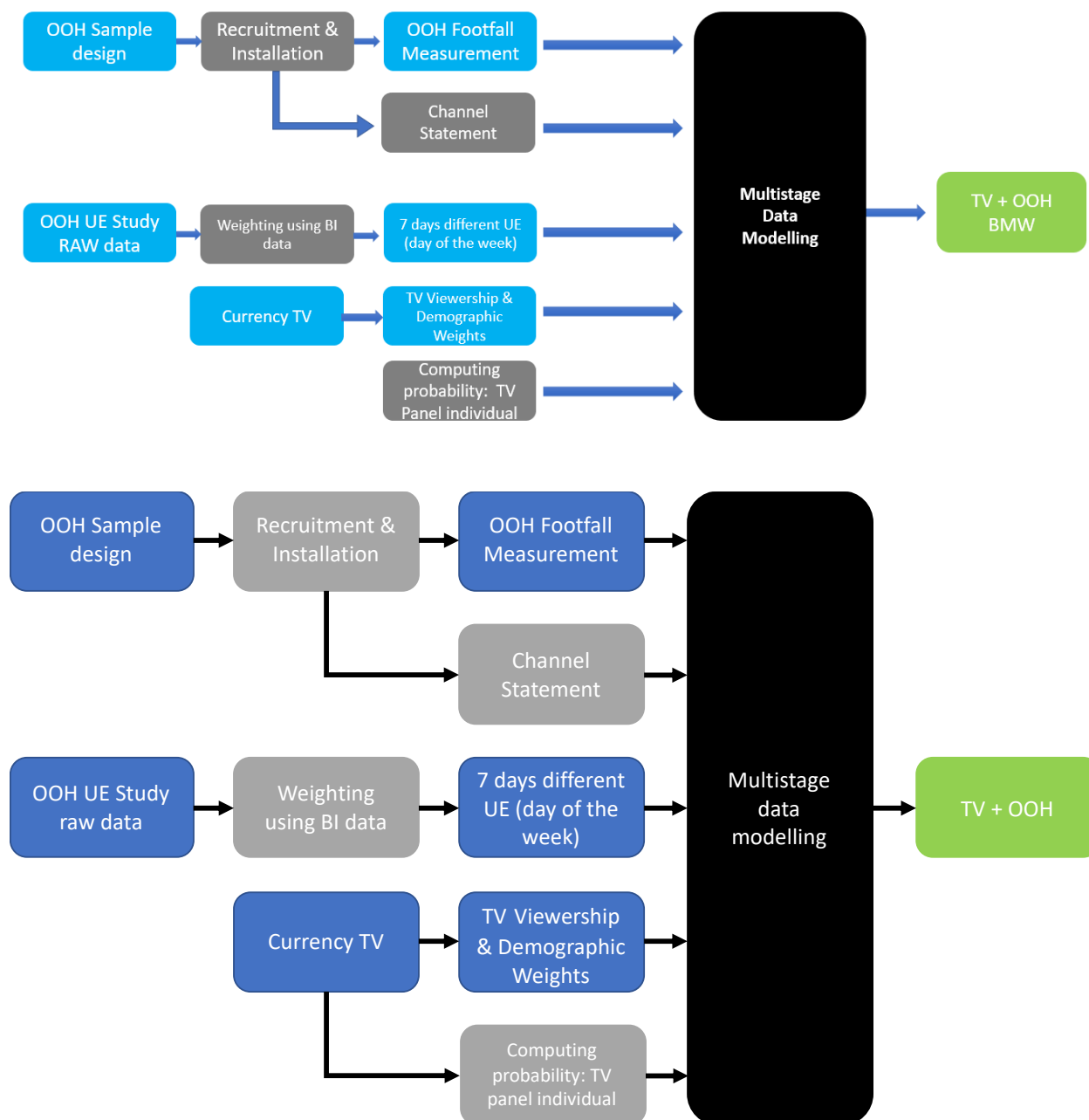


Figure 2. Out-of-Home Process Flow

7. Sources of Error in BARC Television Audience Estimates

BARC's television rating services produces data which is used to produce ratings estimates. Since these estimates are based upon samples, there are several sources of error which they may be subject to. There are many ways to classify survey error, but in the scheme presented by Groves (1989)⁹ we can classify the potential errors associated with BARC's audience estimates as follows:

7.1. Error of Non-observation

There are three main areas where error of non-observation can be attributed to, namely: Sampling Error, Coverage Error and Nonresponse Error.

7.1.1. Sampling Error

Sampling Error can be defined as the error associated by observing a sample rather than a population. This type of error is the main cause of variation in estimates from sample to sample, or, in the case of BARC, over time. Since BARC employs probability samples, theoretically, the amount of possible sampling error in an estimate can be quantified through the Standard Error of the estimate. BARC encourages users to take the associated Standard Error into consideration for all estimates.

7.1.2. Coverage Error

Coverage Error specifically refers to the absence of certain populations in the sampling frame. In the case of BARC's television measurement service, the sampling process ensures that coverage error is minimized. Any non-sampled regions are excluded from the population UEs thereby ensuring that the audience estimates are correctly projected.

7.1.3. Nonresponse Error

Nonresponse Error can be defined as any error which can be attributed to the inability to collect data from certain individuals. This error can include individuals who refuse to participate or individuals who are unable to be contacted (i.e., unit nonresponse) or missing data related to a sample element (i.e., item nonresponse). We can break both unit and item nonresponse into two main components: nonresponse Missing at Random (MAR) and nonresponse Not Missing at Random (NMAR).

In the case of MAR, the nonresponse is non-systematic and therefore not a problem. It can be accounted for through post-stratification, or weighting, techniques but will increase variance in responses. The case of NMAR is more serious since the Nonresponse is systematic and could result in biased estimates.

It is very difficult to measure nonresponse error. Typically, this error is measured through the Response Rate (RR) which is an indication of the success of a survey at representing the population of interest. However, the RR does not differentiate between MAR and NMAR nonresponse, or more specifically, quantify the amount of bias which may be present in the sample.

⁹ Groves, R. M. (1989). *Survey Error and Survey Costs*. New York, NY: Wiley.

7.2. Error of Observation

Errors of Observation are errors which can be attributed to the respondent, instrument or method of data collection. This includes, but is not limited to, panelist compliance, fraudulent behaviour or technical measurement issues.

BARC monitors the panel for extreme tuning, viewing or behaviour and will remove panelists who are not complying properly. In extreme cases, data will be re-issued with the panelist removed.

8. Frame Exclusions and Ineligibles in BARC's Television Panels

The Universe, or target population, for BARC's panels are as follows:

1. Currency Panel (CP) – persons two years of age or older residing in television households in India except those in uncovered areas¹⁰, or geographies that are unreachable due to harsh terrain, distance, or areas with political unrest and safety concerns to the field workers;
2. Out-of-home Panel (OOHP) – eateries in Urban India meeting the following criteria:
 - a. Eateries with working Television set and Mode of signal reception being cable / DTH;
 - b. Independent seating capacity for 24 or more patrons; and
 - c. Located within the city UA limits defined by Census 2011.

BARC uses a sampling process to establish and recruit households; and therefore has a limitation where the sampling frame is smaller than the Universe. This shortage, or gap, is referred as frame exclusion. There are also cases where an household is ineligible or unable to be established or recruited, this is referred to as Ineligibility.

This section outlines the frame exclusions and ineligibilities in the BARC panels.

8.1. Exclusions

8.1.1. Currency Panel Exclusions

There are two primary exclusions in the BARC CP, those related to uncovered areas and those related to other issues.

8.1.1.1. Exclusions Due to Uncovered Areas

Certain areas of India are excluded from the sampling frame for the CP. These uncovered geographies represent 0.6% of Indian households and 0.7% of Indian individuals. Since these areas are not covered in the study, BARC also excludes their estimated population from the BARC India TV Universe Estimates. Therefore, this exclusion will have no impact on the accuracy of BARC's television audience estimates.

8.1.1.2. Other Exclusions

Due to technology reasons, households with either five or more television sets, or more than 13 members are not included on the panel. This represents an immaterial portion of the population, estimated to be 0.5%.

8.1.2. Out-of-home Panel Exclusions

There are no known frame exclusions, outside of data entry error, for both out-of-home sample frames – the Universe study and the establishment panel.

¹⁰ Uncovered areas include Andaman & Nicobar Islands, Lakshadweep, Kashmir Valley, Kargil, Ladakh, and Arunachal Pradesh (except Itanagar).

8.2. Ineligibility

There are three cases which result in Ineligibility to be established or recruited, specifically Media Ineligibility, Households without a Kitchen, and Other Ineligibility.

8.2.1. Media Ineligibility

The following households are ineligible to participate for reason of media affiliation:

1. Households with members employed by Television Broadcasters, or Advertising Agencies (including rep houses) are ineligible to participate; and
2. Households with members who are current or former employees of TAM Ltd or BARC India.

8.2.2. Households without a Kitchen

BARC India requires a residential dwelling to have a kitchen in order for the household to be eligible for recruitment. Households living in a residential dwelling without a kitchen would therefore be considered an exclusion. According to the 2011 Census, about 38.7% of the Indian households (i.e., 9.6 crores) does not have a kitchen. This exclusion is 47.2% and 20.6% in Rural and Urban India respectively. Television households are more likely to greater economic means and therefore the percentage without a kitchen is expected to be significantly lower.

8.2.3. Other Ineligibility

Occasionally households are unable to be established or recruited due to language barriers or sickness/health issues. These households are treated as In-scope non-responding units for the purpose of Response Rate calculations.

Appendix 1. Live Testing Procedures

BARC rarely conducts “live” tests in the panel. If a “live” test is requested either internally by staff or externally by members, the potential impact of the test is assessed by BARC’s Measurement Science Department, Management Assurance Department and the field team (i.e., MDL) before proceeding with the plan. Within BARC, the authority to run any Research or Operational test live, or to change current Standard Operating Procedures on the live panel lies with the Chief of Measurement Science and the Chief Operating Officer.

Immaterial Impact Test

Objectives and procedures are reviewed by and findings reported to BARC’s Technical Committee.

Minor Impact Test

Objectives and procedures are discussed, **approved by** and findings reported to BARC’s Technical Committee.

BARC will communicate to all members that a test is to be conducted and will include the test in the Journal of Changes.

Appendix 2. New Consumer Classification System (NCCS) Assignment Process

The New Consumer Classification System (NCCS) is a means of socio-economically classifying consumers in India. The NCCS classification of a household is based on two main variables:

1. Education of the household’s Chief Wage Earner (CWE), defined as the person who contributes the most to the payment of household expenses; and
2. The ownership within the household of 11 specific durable goods. These durable goods are as follows:
 - a. Electricity connection;
 - b. Ceiling fan;
 - c. LPG stove;
 - d. Two-wheeler;
 - e. Colour TV;
 - f. Refrigerator;
 - g. Washing machine;
 - h. Personal computer / Laptop;
 - i. Car, Jeep, or Van;
 - j. Air conditioner; and
 - k. Agricultural land.

Based upon the above two variables, households are assigned an NCCS grade ranging from A1, being the highest, to E3, being the lowest. The assignment is based upon the grid in Table 21.

Table 21
NCCS assignment grid

	<u>Education of the CWE</u>	<u>Illiterate</u>	<u>Illiterate but no formal schooling / up to 4th standard</u>	<u>Schooling between 5th and 9th standard</u>	<u>SSC / HSC</u>	<u>Some college but not graduated</u>	<u>Graduate / Post- graduate General</u>	<u>Graduate / Post- graduate Professional</u>
	None	E3	E2	E2	E2	E2	E1	D2
	1	E2	E1	E1	E1	D2	D2	D2
	2	E1	E1	D2	D2	D1	D1	D1
Number of Durables Owned	3	D2	D2	D1	D1	C2	C2	C2
	4	D1	C2	C2	C1	C1	B2	B2
	5	C2	C1	C1	B2	B1	B1	B1
	6	C1	B2	B2	B1	A3	A3	A3
	7	C1	B1	B1	A3	A3	A2	A2
	8	B1	A3	A3	A3	A2	A2	A2
	9+	B1	A3	A3	A2	A2	A1	A1