Online Pornography Seeking Behavior and Its Relation to Literacy Rate and Financial Status of Indian States

Shaikat Mondal and Himel Mondal

Abstract

Background: Pornography has become widely accessible due to the popularization of smartphones and internet connectivity. Consuming pornography has multiple effects on an individual and on society. Our research question was if pornography-seeking behavior has any correlation with education and financial status in Indian states.

Objective: To find the online pornography-seeking behavior of Indian internet users according to states and find its correlation with the literacy level and per capita net state domestic product (NSDP).

Methods: Trends of internet search about pornography-related keywords (namely, porn, XXX, Xvideos, and sex) were obtained from a public domain https://trends.google.com/trends. State-wise relative search volumes were compared with the literacy rate and NSDP of the state. Pearson correlation coefficients were calculated with the help of GraphPad Prism 6.01 (GraphPad Software, Inc., California, USA). A \( P < .05 \) was considered statistically significant.

Results: Northeastern states showed a higher volume of overall online pornography searches. There was no significant correlation between the literacy rate and relative search volumes of pornography-related keywords. Overall pornography-related search volume showed a significant negative \( (r = –0.49, P = .003) \) correlation with NSDP.

Conclusion: Online pornography seeking behaviors in Indian states are not related to the literacy rate of the state. A higher volume of searches is from states with lower NSDP. The underlying factors for this finding should be explored in a future study.

Keywords
Erotica, smartphone, literacy, internet, information seeking behavior, pornography

Introduction

Pornography, perhaps the most accessible forbidden material, has been with us from historical time. Over the time, only the medium of pornography has been changed from sculptures, photograph, books, magazine, and video tapes to today’s e-book, digital images, and videos. Internet is an ocean of potentially rewarding explicit content, and it has now become easily accessible and affordable even in developing countries. With ever-increasing demand from the users, pornography has become a stable multibillion-dollar industry.

Smartphones give the user a private space and anonymity. Hence, a combination of smartphone and the internet is the most preferred way of pornography acquisition nowadays. The internet search trend reflects the information-seeking behavior of the internet users. For a sensitive issue like pornography, online anonymized data collection is a better choice than self-report information-seeking behavior. A face-to-face interview or questionnaire-based study may have several bias. “Google trends” provides trends of internet search volume in terms of “relative search volume (RSV)” over the time and according to different geographical locations on their website (https://trends.google.com/trends).
It has been found that higher educational attainment is positively associated with higher usage of pornography in Dutch adolescents.9 Luder et al also found similar picture in Swiss adolescents.10 Study by Lim showed that higher educated young Australians use pornography at a higher rate.11 In contrast, Peter et al reported no relationship of education and pornography use in Dutch adolescents.12 Study by Yang found that people with lower social status, lower income, and higher working hours has lesser opportunity for sexual intercourse and thus uses pornography at higher rate in the USA.13

Literature about pornography-seeking behavior and its association with education and income has not been explored in India. With this background, our research question was if there is any correlation of online pornography-seeking behavior with the literacy rate and the net state domestic product (NSDP) in Indian states.

Methods

Ethics
This study does not involve any human research participants. The data used for analysis were obtained from a public domain which does not restrict a user to analyze their data for any research purpose. Hence, formal ethical clearance was not obtained from the institute for this study.

Settings
Data relating to the internet search trend were collected from the website https://trends.google.com/trends. Literacy rate and NSDP data were collected from Indian governmental websites.14,15 For data collection, we used a personal computer (ASUS VivoBook Max X541N) with internet connection. The data collection was done on 2019, 27 September, between 5 pm and 8 pm.

Process of Data Collection
Pornography-related keywords (viz., porn, XXX, Xvideos, and sex) were selected after reviewing the article by Markey et al.7 These keywords were searched on the Google trends website first individually, then in combination for last 5-year period in India. State-wise RSV data were downloaded from the website for further analysis.

Educational level and per capita NSDP according to different Indian states were collected from a public domain managed by the Government of India.14,15

Data Handling and Statistical Analysis
Collected data were compiled into the spreadsheet software, Microsoft Excel 2010 (Microsoft, USA). The state-wise data were arranged alphabetically to get data of a single state across a row. During this stage, Google trends data of “Lakshadweep” was found to be missing. Hence it was removed from the list. For matching the state-wise RSV of pornography-related keywords, the literacy rate and NSDP of Lakshadweep were removed. Furthermore, the NSDP of Dadra and Nagar Haveli, and Daman and Diu were not obtainable. Hence, during analysis of NSDP and RSV, those 2 states were removed from the RSV list.

For finding the overall pornography-seeking behavior, a mean of RSV of 4 keywords were used.

Pearson correlation coefficient was used to find a correlation of RSV with the literacy rate (percentage) and log-NSDP in GraphPad Prism 6.01 (GraphPad Software, Inc., California, USA). Statistical analysis was presented with correlation coefficient ($r$), 95% confidence interval, and $P$ value. A $P$ value < .05 was considered statistically significant.

Results

State-wise RSV of the keywords are presented in Table 1. The top 5 states searching the word “porn” were Mizoram, Manipur, Nagaland, Arunachal Pradesh, and Chandigarh. The top 5 states searching the word “XXX” were Manipur, Bihar, Assam, Madhya Pradesh, and West Bengal. The top 5 states searching the word “Xvideos” were Kerala, Telangana, Manipur, Assam, and Tamil Nadu. The top 5 states searching the word “Sex” were Manipur, Odisha, Telangana, Tamil Nadu, and Assam.

5-year relative trend for the keywords is presented in Figure 1a. The trend for the same set of the keywords worldwide is presented in Figure 1b. Indian online users search the word “sex” at a higher rate followed by “XXX”, “porn”, and “Xvideos”. Similarly, worldwide search for “sex” was higher than the other keywords. However, “porn” is more searched than “XXX” worldwide. The word “Xvideos” remain the least choice worldwide like in India. The RSV of “sex” and “XXX” were increased over time with a dip at the end of 2018. The trend for other 2 words remains invariably stable over the time. Overall state-wise pornography-related search volume is shown in a heat map in Figure 2.

Figure 1. Five-Year Trends of Internet Search for Pornography-Related Keywords

Source: Graph was obtained and captured from https://trends.google.com
Table 1. Relative Search Volume (RSV) of Different Keywords on the Internet According to Indian States

| Region           | RSV of Porn | Region | RSV of XXX | Region | RSV of Xvideos | Region | RSV for Sex |
|------------------|-------------|--------|------------|--------|----------------|--------|-------------|
| Mizoram          | 100         | Manipur| 100        | Kerala | 100            | Manipur| 100         |
| Manipur          | 88          | Bihar  | 87         | Telangana | 73           | Odisha | 83          |
| Nagaland         | 86          | Assam  | 83         | Manipur | 70            | Telangana | 83      |
| Arunachal Pradesh| 61          | Madhya Pradesh | 67 | Assam | 66            | Tamil Nadu | 81    |
| Chandigarh       | 59          | West Bengal | 66 | Tamil Nadu | 66           | Assam | 80          |
| Assam            | 58          | Gujarat | 63         | Mizoram | 64           | Puducherry | 77     |
| Himachal Pradesh | 56          | Chandigarh | 61         | Puducherry | 64          | Karnataka | 69     |
| Jammu & Kashmir  | 56          | Uttar Pradesh | 59    | Karnataka | 61           | Andhra Pradesh | 68     |
| Gujarat          | 53          | Himachal Pradesh | 58      | Chandigarh | 58          | Mizoram | 67          |
| West Bengal      | 53          | Jammu & Kashmir | 56      | Andhra Pradesh | 56          | Tripura | 60          |
| Meghalaya        | 50          | Odisha  | 56         | Jammu & Kashmir | 56          | Andaman and Nicobar Islands | 58 |
| Uttar Pradesh    | 49          | Arunachal Pradesh | 53      | Odisha | 49           | Himachal Pradesh | 58     |
| Bihar            | 48          | Andaman and Nicobar Islands | 52      | West Bengal | 49           | Chandigarh | 57     |
| Madhya Pradesh   | 48          | Jharkhand | 50         | Maharashtra | 48           | Jammu & Kashmir | 55     |
| Delhi            | 47          | Rajasthan | 49         | Delhi | 45           | Bihar | 53          |
| Punjab           | 46          | Delhi   | 47         | Punjab | 44           | Gujarat | 53          |
| Rajasthan        | 44          | Meghalaya | 46         | Gujarat | 43           | West Bengal | 53     |
| Tripura          | 42          | Maharashtra | 45      | Tripura | 42           | Kerala | 52          |
| Uttarakhhand     | 42          | Dadra and Nagar Haveli | 44      | Andaman and Nicobar Islands | 41          | Nagaland | 52          |
| Andaman and Nicobar Islands | 41 | Tripura | 44 | Himachal Pradesh | 41 | Arunachal Pradesh | 50 |
| Jharkhand        | 41          | Nagaland | 43         | Meghalaya | 41           | Madhya Pradesh | 49     |
| Maharashtra      | 41          | Chhattisgarh | 41       | Nagaland | 40           | Maharashtra | 49     |
| Chhattisgarh     | 40          | Punjab  | 41         | Bihar   | 38           | Rajasthan | 47      |
| Sikkim           | 40          | Sikkim  | 40         | Madhya Pradesh | 38          | Delhi | 44          |
| Haryana          | 38          | Daman and Diu | 37 | Uttar Pradesh | 38          | Meghalaya | 44     |
| Odisha           | 38          | Haryana | 35         | Rajasthan | 35           | Dadra and Nagar Haveli | 43 |
| Daman and Diu    | 31          | Uttarakhhand | 35      | Goa | 34           | Uttar Pradesh | 43     |
| Kerala           | 30          | Karnataka | 29         | Sikkim | 34           | Chhattisgarh | 41     |
| Dadra and Nagar Haveli | 29 | Telangana | 28 | Uttarakhhand | 32 | Jharkhand | 41 |
| Karnataka        | 27          | Mizoram | 26         | Chhattisgarh | 31           | Punjab | 40          |
| Telangana        | 26          | Kerala | 24         | Haryana | 31           | Daman and Diu | 39     |
| Goa              | 25          | Tamil Nadu | 22        | Arunachal Pradesh | 30          | Sikkim | 39          |
| Andhra Pradesh   | 23          | Andhra Pradesh | 20      | Jharkhand | 30           | Uttarakhhand | 34     |
| Tamil Nadu       | 21          | Puducherry | 18        | Daman and Diu | 29          | Haryana | 32          |
| Puducherry       | 19          | Goa | 15         | Dadra and Nagar Haveli | 25 | Goa | 27 |

No data for Lakshadweep

Source: Data obtained from https://trends.google.com
Figure 2. Indian State-Wise Online Pornography-Seeking Behavior

Source: Heat map was generated and captured from www.danielpinero.com

Table 2. Correlation of Education (%) and Relative Search Volume of Online Pornography-Seeking Behavior

| Keywords | $r$   | 95% CI              | P   |
|----------|-------|---------------------|-----|
| Porn     | 0.07  | -0.2686 to 0.3950   | .69 |
| XXX      | -0.33 | -0.5953 to 0.007337 | .06 |
| Xvideos  | 0.27  | -0.07226 to 0.5516  | .12 |
| Sex      | -0.04 | -0.3688 to 0.2968   | .82 |
| Overall  | -0.03 | -0.3599 to 0.3062   | .86 |

Notes. $r$, Pearson correlation coefficient; CI, confidence interval.

Table 3. Correlation of Per Capita Gross State Domestic Product and Relative Search Volume of Online Pornography-Related Keywords

| Keywords | $r$  | 95% CI              | P   |
|----------|------|---------------------|-----|
| Porn     | -0.39| -0.6435 to -0.04829 | .03*|
| XXX      | -0.64| -0.8064 to -0.3806  | <.001*|
| Xvideos  | 0.07 | -0.2782 to 0.4054   | .69 |
| Sex      | -0.23| -0.5340 to 0.1196   | .19 |
| Overall  | -0.49| -0.7149 to -0.1793  | .003*|

Notes. $r$, Pearson correlation coefficient; CI, confidence interval; *statistically significant P value.

Figure 3. Correlation of Online Pornography-Seeking Behavior and Net State Domestic Product Per Capita

Notes. NSDP, net state domestic product; RSV: relative Search volume.

Discussions

Region-Wise Pornography-Seeking Behavior

In this study, we report Indian state-wise data on pornography-seeking behavior on the internet. It is found that overall pornography-related keywords are searched at the highest volume from the northeastern states. This information-seeking behavior may be due to lesser sex education in the region. Hence, governmental and nongovernmental organizations may think about strengthening formal sex education in the northeastern region of the country. Another reason is lower socioeconomic status of the states. However, if we take individual keywords, there are other states which top on the list of top-five states searching for the keywords (Table 1). Hence, the underlying factors except the socioeconomic status should be further explored.

Pornography-Seeking Behavior and Literacy

The relationship of the pornography-seeking behavior with literacy rate was neither quantitatively nor statistically significant (Table 2). This finding does not support the previous study conducted on adolescent and youth in the Netherland, Switzerland, and Australia. Majority of the previous study found a positive relation between these 2 variables.9-11 There may be various reasons behind this noncorroborative finding. The finding of the previous study was based on survey on the population level. In the current study, we used online user data which is a part of population having access to the internet. Further, there may actually be a difference between the pornography usage and the pornography-seeking behavior. Simply, a pornography user
may not seek information from the internet. On the other hand, an information seeker may not use pornography. In addition, we used the data as the literacy rate, not the level of literacy. Whether a graduate seeks more or less pornography than a high school pass out is a topic of future research in India.

Pornography-Seeking Behavior and Economy

The online pornography-seeking behavior was found to be negatively correlated with NSDP. This finding suggests that an increase in NSDP decreases the pornography-seeking behavior or vice-versa. This finding is corroborative with study by Yang from the USA. A higher socioeconomic status enables people to have access of various entertainment opportunities and sexual exposures. This may be the reason for less pornography-seeking behavior in states with higher NSDP. However, socioeconomic status at the individual level and its relation with pornography-seeking behavior remain a topic of future research.

Effect of Pornography Usage

Many teenagers and young adults use pornography as a resource for sex education, while others use it for sexual arousal. Exposure to pornography increases the frequency of sexual encounters. In addition, excessive watching of pornographic content may influence the sexual life or even increases chances of relationship breakdown. There is also reduction of grey matter volume with high exposure to pornographic content. In contrast, at the social level, a higher usage of pornography is associated with a reduced rate of rape. This statement may seem to be an oversimplification of the data of pornography usage and the rate of rape. Kutchinsky showed that pornography usage has no association with the rate of rape. India has a strict law to prevent production, storage, and usage of the child pornography (ie, explicit content showing children). However, adult pornography is not banned, but not even legalized. Indian telecom operators have banned many pornography websites which may be the cause of a dip in the trend data near the end of 2018 (Figure 1a). This also proves that a huge number of internet searches are for pornography. Despite the ban, the search volume does not show any decline. Hence, in India, pornography remains the accessible forbidden matter with unproven advantage or disadvantage.

Novelty of This Study

This study reports anonymized online pornography-seeking data at the national level and reports correlation data on the pornography-seeking behavior with state-level literacy and NSDP. There is no previous study on this topic from India. The data may be considered devoid of any bias from the level of data collector to the respondents which otherwise may present in survey-based data. However, the literacy and NSDP data itself may have some minor error as it actually comes from field-level survey.

Limitation of the Study

Only Google provides the search trends; hence, we could not analyze data from other websites (eg, Yahoo, Bing). However, Google search shares 92.96% on all platform and 95.86% of mobile global searches. Only search result in English was considered. Though there are diverse languages in India, English is the popular search language and it is the major language (54.6%) on the internet and Hindi search comprised of only 0.1%. There are some missing data relating to a few states at the level of Google trends website and governmental websites. Hence, those states were excluded from the analysis.

Conclusion

Overall, northeastern states of India showed higher volume of internet search for pornography. The literacy rate of states does not have any relation with online pornography-seeking behavior. States with lower NSDP search pornography at a higher rate than the states with higher NSDP. Exploration of the underlying reason of this finding should be a future research topic.

Declaration of Conflicting Interests

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ORCID iD

Shaikat Mondal https://orcid.org/0000-0001-5027-4657
Himel Mondal https://orcid.org/0000-0001-6950-5857

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