Assessment of Swachh Bharat Mission - Clean India Campaign's Contribution in Combating Violence against Women

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Abstract

In this article, we present the results after assessing the Indian's Swachh Bharat Mission's (SBM) (aka Clean India Campaign) contribution in combating violence against women and girls while attending nature's call. Towards this, firstly we have used the publicly available data from National Crimes Records Bureau (NCRB - India) to identify the hotspot districts with highest crimes against women in the country. Various districts in West Bengal, Andhra Pradesh/Telangana, and Assam were top in the list of hotspots for gender based crimes; these districts were prioritized for investigation in this study. Context-driven web crawlers were developed and used to retrieve the reported crimes against women and girls from the district editions of electronic newspapers from 2010 till 2018. The results obtained from this web crawler were analyzed to determine the trend of gender-based sexual assaults before and after SBM implementation. It is observed that post SBM implementation, sexual assaults were reduced and the declining trend of crimes exhibited similar pattern for all the districts in the three states. The first dip in the trend has occurred during 2016 and consequently, there is reduction of crimes against women from 2017 onwards. The availability of sanitation infrastructure in the form of Independent Household Latrines under SBM's program should have influenced the reduction of practicing the open defecation to a certain extent, and the reduction in open defecation practice has helped in reducing the scope of sexual encounters during the course of routine sanitation needs. It is observed that in 2016, sexual assaults have downsized to 65 per cent and by the year 2018 the percentage dip in reduction of violence against women is more than 90 per cent.

Keywords: Swachh Bharat Mission, Open Defecation, Gender based Violence, Sexual Assaults, Natural Language Processing, Web Crawlers.

1.   Introduction

Open defecation alludes to the practice whereby people go out to open fields, roadsides, bushes, the periphery of water bodies, nearby forests, ditches, or other open spaces rather than using the toilets for attending the nature's call (UNICEF, 2019). Lack of sanitation infrastructure in developing and populous countries like India, Bangladesh and Nigeria, will give people a little choice but to defecate in the open. Open defecation is predominantly a rural practice (WHO-UNICEF, 2008). Women, in particular will suffer due to the absence of sanitation facilities and they have to walk for miles away from home to reach a secure place to relieve themselves. During this process, they are more susceptible to become victims of humiliation and sexual assaults. Genesis of Swachh Bharat Mission (aka Clean Indian Campaign) has its inception during October 2014 with a core objective of accelerating efforts to achieve universal sanitation coverage. This mission aims to improve the general quality of life in rural areas by promoting cleanliness, hygiene, and eliminating the practice of open defecation. SBM has motivated the communities and institutions to adopt sustainable sanitation practices and facilities through raising awareness and health education. SBM encouraged cost-effective and appropriate technologies for ecologically safe and sustainable sanitation (SBM, 2019).

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By the end of June 2019, over 95 billion toilets were built across India since the launch of SBM, and during which 5.5 lakh villages declared with Open Defecation Free (ODF) status (PIB, 2019). The ambitions of SBM aims for the largest behavioural change programme in the world (Mohapatra, 2019).

The implementation of SBM was aligned with the 2030 agenda and specifically tailored to the target 6.2 of Sustainable Development Goals (SDGs). The target 6.2 says, "By 2030, achieve access to adequate and equitable sanitation and hygiene for all, and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations". The SDGs, referred as the Global goals are an interconnected network of targets for economic wellbeing, social inclusion and environmental sustainability. Some of the targets reinforce each other; that is achieving one target will also support the achievement of another. Target 5.2 of SDGs says, "Eliminate all forms of violence against all women and girls in public and private spheres, including trafficking and sexual and other types of exploitation". A study conducted by UN-Water (2016) confirms the reinforcing relationship between the targets 6.2 and 5.2.

In this article, we assessed the SBM's contribution in combating violence against women and girls when they go out for attending nature's call. Towards this, firstly we have used the publicly available data from National Crimes Records Bureau (NCRB - India) to identify the hotspot districts for crimes against women in India. These hotspot districts were prioritized for further investigation in the study. Context-driven web crawlers were developed and used to retrieve the reported crimes against women and girls from the district editions of electronic Newspapers from 2010 till 2018. The results obtained from this web crawler were analyzed to determine the trend of gender-based sexual assaults before and after SBM implementation.

2.   Background

Countries in Central Asia, Southern Asia, and sub-Saharan Africa are dominant for open defecation practice and of those who practice it, most of the people live in rural areas (UN-Water, 2018). Freeman et al. (2017) reported public health concerns (like diseases related to diarrhea, Soil-Transmitted Helminths (STH), Schistosomiasis, Trachoma, and malnutrition issues) due to fecal matter exposure in the environment. Investigations done by Mara et al. (2010) and Brown et al. (2013) have mentioned the malefic effects of fecal-oral infections on the children. The disease burden due to poor sanitation will put a dent to the nation's Gross Domestic Product (GDP) (De Francis, 2011; LIXIL, 2016). Dandabathula et al. (2019) have discussed the adverse effects of open defecation on the environment, society and economic dimensions of sustainable development.

Analysis of sanitation-related psychosocial stress done by Sahoo et al. (2015) based on in-depth interviews with women, described that sexual stressors like teasing, watched by men while attending nature's call (peeping), men exposing themselves to women (flashing), and gender-based violence including extreme sexual assaults. Azeez et al. (2019) has done a structured interview with women and found that women's experience of open defecation is accompanied by fear, shame, lack of privacy and dignity, and conflict; all of these will impact the overall quality of life and health issues.

Mishra (2015) in his studies mentioned the pathetic conditions of women and girls when they go for open defecation in extreme weather conditions like heat, cold, and rains and also under constant threat of being watched, molested, and raped. Koonan (2019) reported that open defecation may provide an opportunity for men to commit violence against women and girls. Hirve et al. (2014), Clair et al.(2016), Jadhav et al. (2016), O'Reilly (2016), Winter and Barachi (2016), Caruso et al. (2017), Mara (2017), and Saleem et al. (2019) mentioned that lack of access to adequate sanitation may increase the scope of vulnerability of women and girls to gender-based violence.

Ambesh and Ambesh (2016) hinted that media should play a central role to bring reforms in the issues like open defecation. The incident of 2014 gang-rape and murder of two teenage girls in Katra village of Budaun district in Uttar Pradesh, India got widely reported by the media and in turn, has thrown light on much-needed sanitation interventions in India. Scholars like Abrar (2015), Doron and Raja (2015), Thomas and Kumar (2015), and Sikka (2016) have quoted this incident in their respective case studies. In rural India, many cases of gender-based violence go unreported because of various issued related to shaming, fear of retaliation, humiliation, and other personal reasons (Diverde, 2013; Sacks et al., 2018; Babu, 2019).

Koonan (2019) in his studies mentioned about newspapers reports related to gender violence can act as a yardstick to measure the social development. Sacks et al. (2018) has done a content analysis of local newspaper reporting in the United States in the context of sexual assaults using descriptive statistics and conducted a series of chi-square analyses.

In the context of India, the sexual assault cases that happen in the rural areas will be covered mostly by district-level editions of the newspapers. Thus, content analysis of district-level newspapers will yield an indicator for violence against women and girls while attending nature's call.

3. Materials and Methods

Figure 1 represents the methodology that was used in this investigation. The methodology has two stages, of which the first stage is used to derive the hotspot districts of highest average crime rate against women. The next stage contains a software module which retrieves the events that were reported in the district editions of respective state's electronic newspapers.

Archived NCRB data has been considered in the first stage of investigation. NCRB is an Indian government agency that is responsible for collecting and analyzing crime data as defined by the Indian Penal Code (IPC) and Special and Local Laws (NCRB, 2019). NCRB has published district-wise data from 2001 till 2015 (CCAW-2001/2012, 2012; CCAW-2013, 2013; CCAW-2014, 2014; CCAW-2015, 2015) and are available at Open Government Data (OGD) web portal (OGD, 2019). Earlier, NCRB data has been used by researchers like Karmakar (2013), Sridharan (2019), and Maity (2019) for their investigations towards retrieving the trend of crimes against women in India.
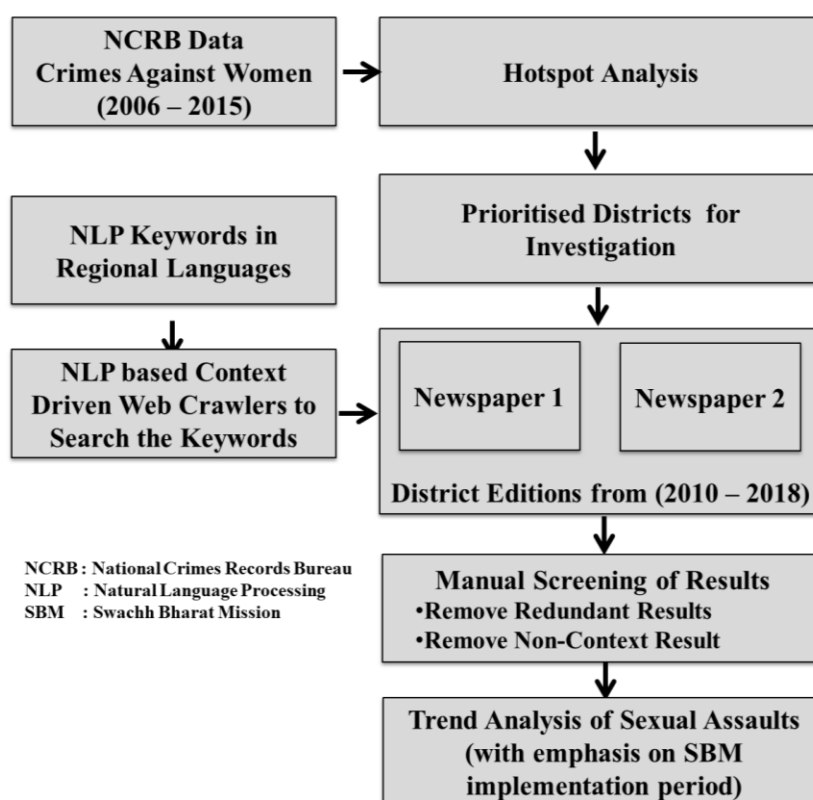

Figure 1. Methodology for assessment of sexual assaults during open defecation practice based on the National Crimes Records Bureau data and reported events in the Newspapers.

Data from 2006 till 2015 has been used to perform the decadal hotspot analysis for the crimes against women in India. Figure 2 shows the district map of average crimes (per year) committed against women from 2006 till 2015. As per the NCRB database, the crimes against women are categorized as below.

- Rape / Attempt to commit Rape / Kidnapping & Abduction
- Dowry Deaths / Protection of Women from Domestic Violence Act, 2005
- Assault on Women with intent to outrage/ insult to the modesty of Women
- Cruelty by Husband or his Relatives
- Importation of Girls from Foreign Country
- Abetment of Suicides of Women
- Protection of Children from Sexual Offences Act and Immoral Traffic Prevention Act

From the hotspot analysis, it is observed that metropolitan cities like Delhi (national capital region), Kolkata, Mumbai, Bangalore, Hyderabad/Cyberabad, Lucknow, Kanpur, and Ahmedabad records the maximum number of cases related to crimes against women. As the article scope is restricted to rural areas, these metropolitan cities were excluded in this research. The top 15 districts with the highest crime rate against women fall in three states as shown in table 1.
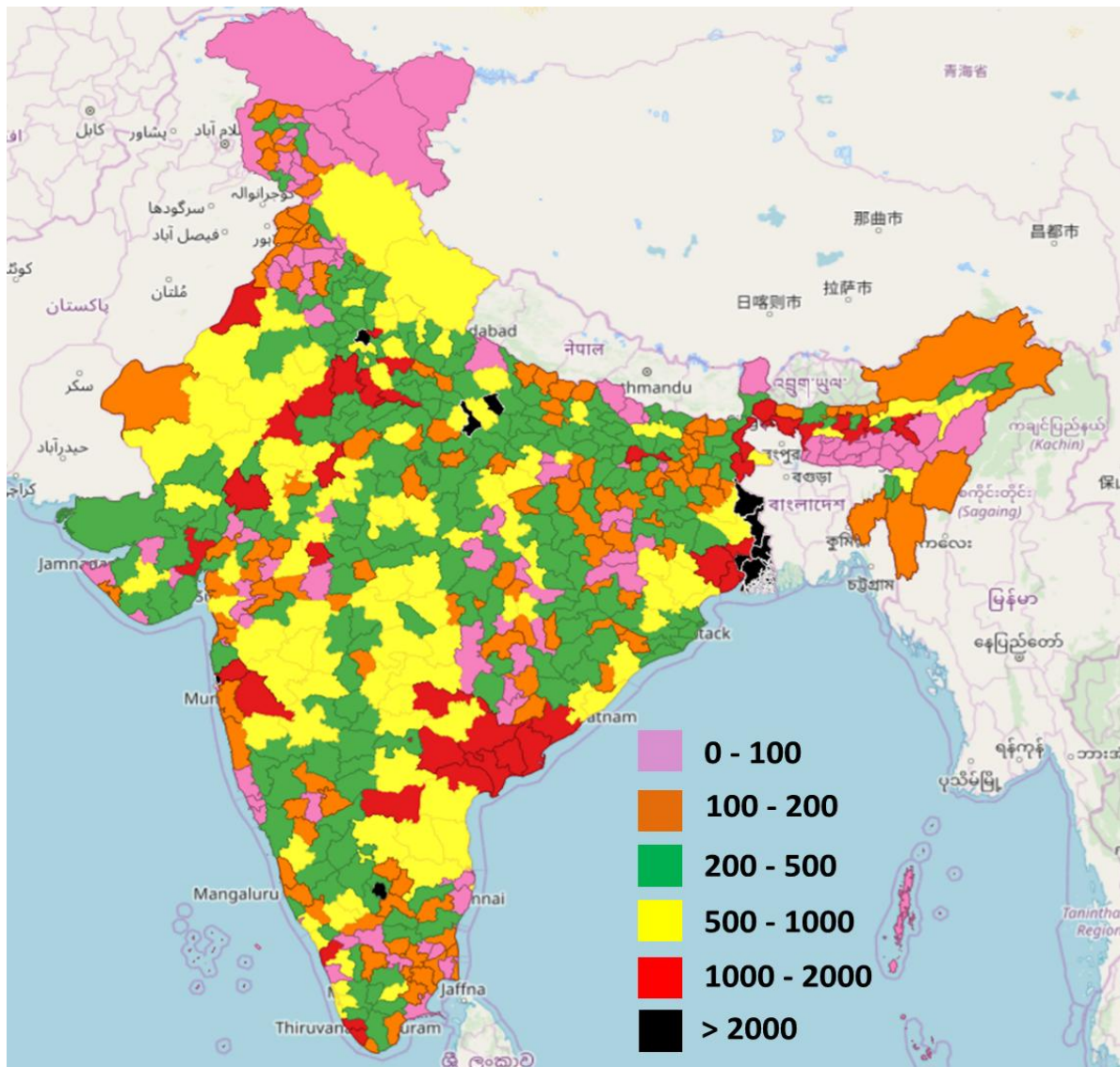

Figure 2. Map showing hotspot districts with highest rate of crimes committed against women in entire India from the year 2006 till 2015. (Source: National Crimes Records Bureau: 2006-2015).

The vulnerable conditions for women in districts like South 24 Paraganas, North 24 Paraganas, Murshidabad, and Nadia of West Bengal state were discussed earlier by the scholars like Karamakar (2013). Investigations done by Ghosh (2010) confirmed that districts like Jalpaiguri and Paschim Medinipur are in the top list of districts with crimes against women. Concerning Andhra Pradesh/Telangana states, districts like Krishna, Guntur, West Godavari, and Karimnagar are on the top in the table of crimes against women; The state of crime rate against women in these districts were also earlier reported by (Singh and Singh, 2008; NEWS-Article, 2012; NEWS-Article, 2014; NEWS-Article,2018a; NEWS-Article,2018b; Goswami, 2019). Goswami (2019) has analyzed pattern of crimes against women from 1990 till 2016 and concluded that states like Nagaland, Manipur, Mizoram, and Meghalaya which are in the North-eastern region of the country have significantly lower crime rate compared to the other parts of the country. On the other hand, even though Assam being in the North-eastern part of India has emerged out as one of the most unsafe places for women. Districts like Nagaon, Barpeta, Dhurbri and Kamrup fall in very high crime rate zones (Borah and Das, 2017).

Table 1. The top 15 districts (excluding metropolitan cities) with highest crime rate against women in India from 2006 till 2015. (Source: National Crimes Records Bureau: 2006-2015).

State	Hotspot Districts
West Bengal	South 24 Paraganas North 24 Paraganas Murshidabad Nadia Jalpaiguri Hooghly PaschimMedinipur
Andhra Pradesh & Telangana	Krishna Guntur West Godavari Karimnagar
Assam	Nagaon Barpet Dhubri Kamrup

A Natural Language Processing (NLP) based crawler has been developed to search the electronic editions of the district level content in the newspapers pertaining to these hotspot districts. A Web crawler sometimes called a spider or spiderbot and often shortened to crawler, is an Internet-bot that systematically browses the pages of World Wide Web. Recently scholars have started using this technology for effective data mining from the internet (Udaypure et al. 2014; Vishwakarma et al. 2019; Kutty et al. 2019) and were detailed by the authors like Amato et al. (2019) and Karlgren et al. (2019). The crawler was made to search the internet from respective district level newspaper editions from January 2010 till December 2018. NLP algorithm takes the cues from the keywords data (in our case the regional languages like Bengali, Telugu, and Assamese languages). The crawler program is made to search for the below keywords.

- Women or Girl or Minor Girl (one of the word to be mandatory in the search result)
- Rape / Gang Rape / Molestation (one of the word to be mandatory in the search result)
- Attending the nature's call / defecation / relieving (one of the word to be mandatory in the search result)
- Early morning / wee hours/ night/ evening (optional keyword)
- Stalking / Physical Attack / Assault / Suicide / Shame / Privacy (optional search terms for rank 2)
- Agriculture field / open field / forest / outskirts (optional search terms for rank 2)

Table 2 represents the keywords that act as input parameters for NLP based program to perform the search operations.

Table 2. Keywords in Telugu, Bengali, and Assames languages for NLP algorithm to detect sexual assaults against women while attending natures' call.

English	Telugu	Bengali	Assamese
Rape / Raped	అత్యాచారం	ধর্ষণ / ধর্ষিত	ধর্ষণ / ধর্ষিত
Attempt to Rape	అత్యాచారానికిపాల్పడేప్రయత్నం / అత్యాచరయత్నం	ধর্ষণেরচেষ্টা	ধর্ষণৰ চেষ্টা
Kidnap / Abduction	అపహరణ	অপহরণ	অপহৰণ
Women	మహిళ	নারী	নাৰী
Girl	బాలిక / అమ్మాయి	বালিকা	ছোৱালী
Gang rape	సామూహికఅత్యాచారం	গণধর্ষণ	গণধর্ষণ

Molested	లైంగిక	শারীরিকশ্লীলতাহানি	শাৰীৰিক শ্লীলতাহানি
Attack / Assault	దాడి	আক্রমণ / লাঞ্ছনা	আক্রমণ / লাঞ্ছনা
Open defecation / Nature's call	దొడ్డి / బహిర్భూమి	বাহিরেমলত্যাগ করা / পায়খানা	বাহিৰতমল কৰা / পায়খানা
Stalking	వెంటపడి	অনুসরণ করা	অনুসৰণ কৰা
Outskirts	శివార్లలో	প্রান্তদেশ	প্রান্তদেশ
Agriculture fields	పొలం	কৃষিক্ষেত্র	কৃষিক্ষেত্র
Morning / evening / night / wee hours	ఉదయం / సాయంత్రంరాత్రి / సంధ్యవేళ	সকাল / সন্ধ্যা / রাত	ৰাতিপুৱা / সন্ধ্যা/ৰাতি

Web-portals of the top two newspapers (in terms of circulation) for respective states were used to search for the district editions. Post search operations; the results were routed to a module to delete the duplicate entries if appeared in both the newspapers based on the similarity, date, and place of incident. Finally, a manual check was done to confirm the context of event.

4.   Results

Table 3 shows the results with the count of events that have matched with the keywords in the hotspots districts. Figure 3, 4, and 5 show the trend line of these events from 2010-2015 for those crimes against women while attending nature's call in the states of West Bengal, Andhra Pradesh/Telangana and Assam respectively.

From the trend line of West Bengal, it is observed that from the year 2010 till 2015, the events that were found in the newspaper for 7 districts are of the range 693 to 792. From the year 2016 onwards there is a substantial decline in the count of the events and also, a further decrease for the year 2017 and 2018 has been observed. A similar pattern has been observed for the hotspots districts of the states of Andhra Pradesh/Telangana and Assam.

The Rate of Change (ROC) for any countable social event is a momentum-based technical indicator that measures the percentage change between the current value and certain periods ago (Wold, 1980; Cobb et al. 1995). From table 3, the ROC of the sexual assaults against women while attending the nature's call from 2010 to 2016 has been decreased to more than 60 percent for all the states and for that of 2010 to 2018, the decline is more than 90 percent. Table 4 shows the number of Independent Household Latrines (IHHL) constructed until the end of January 2019.

Table 3: NLP based results – Crimes committed against women while attending natures' call (2010-2018)

Hotspot Districts	News Papers	No. of sexual assaults during open defecation reported in the Newspapers										
		2010	2011	2012	2013	2014	2015	2016	2017	2018	ROC-A	ROC-B
South 24 Paraganas North 24 Paraganas Murshidabad Nadia Jalpaiguri Hooghly PaschimMedinipur	AnandabazarPatrika at www.anandabazar.com BartamanPatrika at www.bartamanpatrika.com	723	792	734	713	702	693	248	118	72	-65.7	-90.04
Krishna Guntur West Godavari Karimnagar	Eenadu at www.eenadu.net Sakshi at epaper.sakshi.com	412	461	389	424	489	411	142	94	39	-65.53	-90.53
Nagaon Barpet Dhubri Kamrup	AsomiyaPratidin epaper.asomiyapratidin.in AssamiyaKhabor www.assamiyakhabor.com	414	442	481	411	484	466	155	36	28	-62.56	-93.24
ROC-A : Rate of Change in Trend from 2010 to 2016 ROC-B Rate of Change in Trend from 2010 to 2018												

Plot Representing Sexual Assaults on Women During Open Defecation – Hotspot Districts of West Bengal

7 districts in West Bengal
- South 24 Paraganas
- North 24 Paraganas
- Mushidabad
- Nadia
- Jalpaiguri
- Hooghly
- Paschim Medinipur

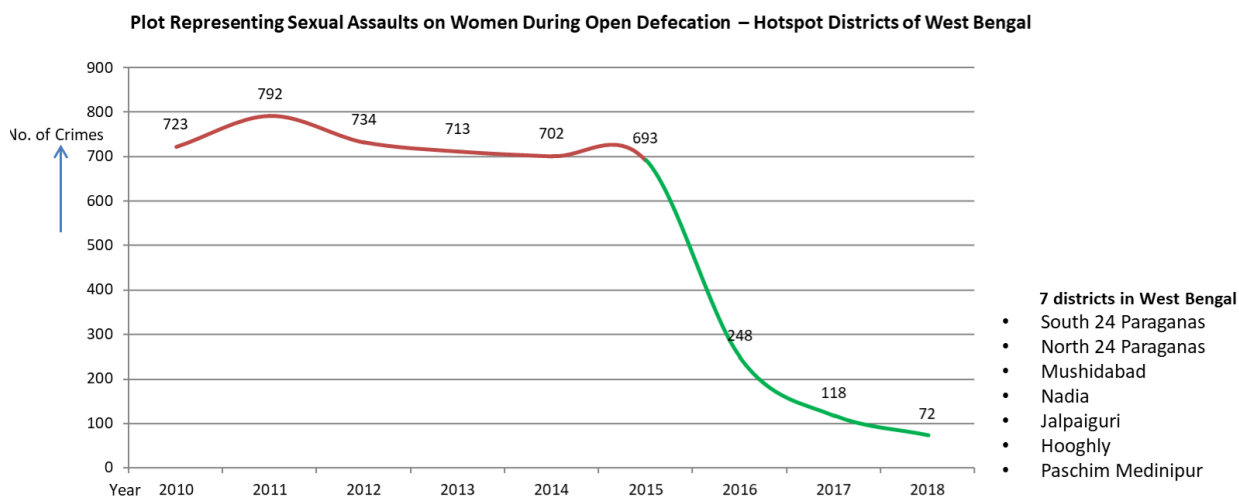**Figure 4.Tread line representing the yearly count of news reports related to sexual assaults on women during the practise of open defecation in the hotspot districts of Andhra Pradesh/Telangana (2010 - 2018).**
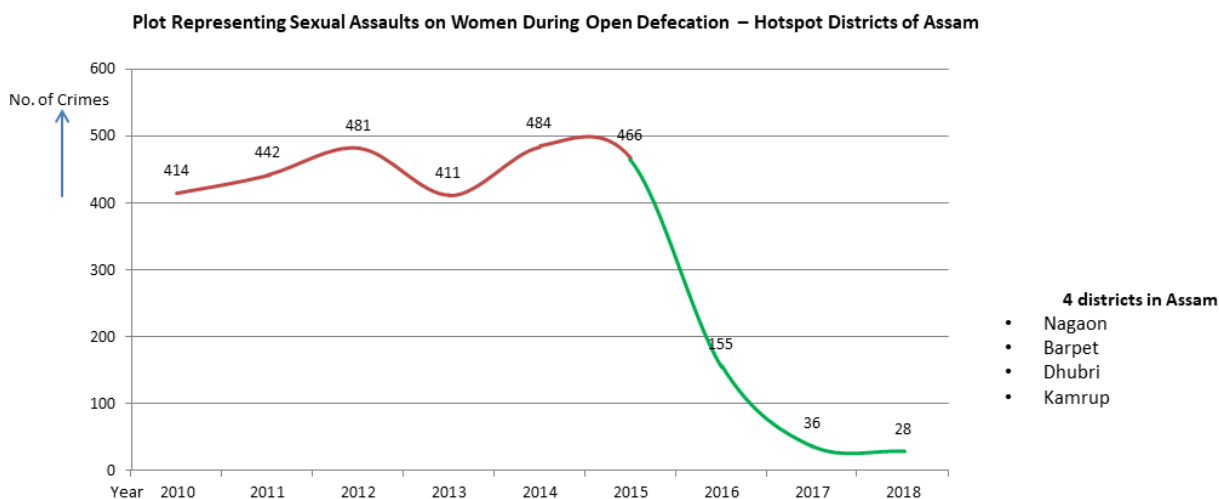
Plot Representing Sexual Assaults on Women During Open Defecation – Hotspot Districts of Assam

4 districts in Assam
- Nagaon
- Barpet
- Dhubri
- Kamrup

Figure 5.Tread line representing the yearly count of news reports related to sexual assaults on women during the practise of open defecation in the hotspot districts of Assam (2010 - 2018).

Table 4. Number of Independent Household Latrines (IHHL) constructed till the end of January 2019 under Swachh Bharat Mission – Gramin) (Source: Data-SBM, 2019)

State	Hotspot Districts	Number of IHHL constructed till January 2019
West Bengal	South 24 Paraganas	14,68,736
	North 24 Paraganas	9,72,013
	Murshidabad	1,25,7701
	Nadia	9,73,305
	Jalpaiguri	3,21,413
	Hooghly	8,74,565
	PaschimMedinipur	7,31,299
Andhra Pradesh/Telangana	Krishna	6,17,692
	Guntur	7,23,466
	West Godavari	5,91,348
	Karimnagar	1,64,238
Assam	Nagaon	2,75,598
	Barpet	3,19,586
	Dhubri	2,84,562
	Kamrup	2,91,066

5.   Discussion

NCRB data has helped in identifying and prioritizing the districts to be investigated in this study. Following the mechanism recommended by Singh and Singh (2008), Borah and Das (2017) and Sakhs et al. (2018), we used events reported in the newspapers. And these events acted as a starting point to investigate the studies involving crimes against women. Data mining approaches using NLP provided effective methods for retrieving the context-based information from the web portals using a crawler programs. Earlier, Liu (2007), Weng et al. (2011) and Guo et al. (2019) too used similar technology.

The practice of open defecation amplifies the scope for non-partner sexual violence. Majorly, there exist critical issues that are related to the lives of women and girls due to poor sanitation infrastructure that can lead to sexual violence, psychological violence, physical violence and social-cultural violence (House et al. 2014; Mills and Cummung, 2016). This sort of violent events can also have long-term psychological impacts (Sahoo et al., 2015). Most of the sexual assaults go unreported in the media but the reported cases may act as an indicator for measuring the sexual assaults. Analysis performed from the year 2010 till 2018 in the hotspot districts of the three states have indicated a similar pattern of the declining trend. The first dip in the trend has occurred during 2016 and consequently, there is a high declining downtrend from 2017 onwards. The increase in sanitation infrastructure in the form of IHHL should have reduced the open defecation practice to significant extent, and reduction in open defecation practice has helped in reducing the scope of unwanted sexual encounters against women and girls while attending the nature's call. It is observed that by the end of 2016, sexual assaults have downsized to 65 per cent and by the end of year 2018, the percentage dip is more than 90 per cent. The intervention in the form of SBM has proved to be a constructive one to bring a positive change against sexual assaults that happen during the sanitation needs.

6.   Conclusions

The practice of open defecation in India has tarnished the nation's reputation at global scale. Eradication of open defecation in India is the need of the hour as it has been neglected long back. There are numerous negative impacts of open defecation that lead to unsustainability in economy, society, and environmental dimensions of sustainable development; of that, the biggest is the gender-based violence. From this study, it is evident that SBM has helped in realizing the targets like 5.2 and 6.2 of SDGs by giving special attention to the needs of women and girls, as well as towards ending violence against women and girls by providing a protected private sphere.

Issues related to Water, Sanitation, and Hygiene (WASH) can be a strategic entry point to women's empowerment. SBM has acted as a catalyst in this endeavor and resulted in creating a new India where gross inequalities within societies have reversed and violence against women has significantly reduced.

Computational technologies can be leveraged for women security issues and to provide better access to the inclusion of gender base studies. This article has effectively used the power of natural language processing based web crawling technology to gather much needed information from the newspapers and assess the situation of violence against women during sanitation needs. Gender data should be mainstreamed into the national statistical strategies and priorities as a part of government policies through regular data collection processes.

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Conflict of Interest

The Authors declare that there is no conflict of interest.

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