ISSN 0258-0438

MAN & DEVELOPMENT

Volume XLIII No. 4 **December 2021**

Centre for Research in Rural and Industrial Development
Chandigarh

Add for Book on Perspectives on Bilateral and Regional Cooperation:
South and Central Asia

MAN & DEVELOPMENT

Man & Development is a peer reviewed quarterly multidisciplinary social science journal. It has set itself the ambitious task of critically analysing the complex process of our political, social, economic and cultural transformation. Since India represents an ancient society and civilisation, we are equally interested in examining the validity or otherwise of our past heritage in relation to our present concerns. We see the trajectory of change and transformation of India in the wider context of a changing world. These being our concerns, we invite articles bearing on one or the other aspects of the transition and transformation, both at the micro and macro levels. We would, especially, like to involve our young scholars who might be dispersed all over but are equally deeply concerned about our country. Authors alone are responsible for their views expressed or authenticity of data used.

Preferred length of an article is between 6000 and 7500 words including references. All articles must be accompanied by an abstract of 100-150 words as a single paragraph together with approximately six keywords must accompany the paper. It should state the objective, scope (theme, study area and time frame), methodology, main findings and the derived message of the paper.

Articles should be submitted via email to: crridpub1@gmail.com

All editorial correspondence should be addressed to:
Mr. Meenal K Barua
In-charge Editorial Research and Publication
Centre for Research in Rural and Industrial Development, Sector 19-A,
Madhya Marg, Chandigarh - 160 019 (India)

Computer Assistance
Mr. Hem Singh, Computer Operator

Visit for submission guidelines and other details at:
http://www.crrid.res.in/journal/

ANNUAL SUBSCRIPTION RATES

(*For Four Issues*)

	Within India	**Outside India**
Individual	Rs. 800/-	US $ 60 UK 40
Institutional	Rs. 1,000/-	US $ 75 UK 50

Please remit your annual subscription fee only through Demand Draft in favour of CRRID, Chandigarh payable at Chandigarh.

ADVERTISEMENT TARIFF

Back Cover

Casual: Rs. 13,000/-; US $ 500
Contract: Rs. 50,000/-for four insertions; US $ 1500

Inside Covers

Casual: Rs. 10,000/-; US $ 325
Contract: Rs. 35,000/-for four insertions; US $ 1000

Inside Pages

Casual: Rs. 7,000/-; US $ 225
Contract: Rs. 25,000/-for four insertions; US $ 800

Centre for Research in Rural and Industrial Development (CRRID), Chandigarh is affiliated with Indian Council of Social Science Research (ICSSR), New Delhi.

MAN & DEVELOPMENT

Volume XLIII No. 4
December 2021

CONTENTS

Man & Development
Vol. XLIII No. 4, December 2021,
http://www.crrid.res.in/journal/
ISSN 0258-0438

A SOCIO-POLITICAL STUDY ON DAMS INDUCED DISPLACEMENT, IMPOVERISHMENT RISK OF LANDLESSNESS AND SOCIAL DISARTICULATION AND RECONSTRUCTION MODEL OF PROJECT AFFECTED PEOPLE IN ASSAM

Madhusmita Devi[1]

Abstract: Assam, one of the Northeast Indian states, presents a majestic landscape characterized by stunning hills, sprawling valleys, and mighty rivers enriched by diverse vegetation and forest cover. Due to 'geographical space' abundantly available in the northeastern region, the Government of India has decided to make this region as 'powerhouse of India' and the Centre has approved 168 dams including both mega -dams and small dams to be built in the region in the new millennium. The initial rationale for dams i.e. flood moderation for a region ravaged by annual floods bringing in despair to the peasant economy was transformed into the model of the future storehouse of hydropower. But, there has been widespread public discontentment over the issue of dams in the Northeast, especially in Assam due to the perception that the indigenous communities of Assam shall be deprived of the benefits and instead suffer threats to their environment, livelihoods and culture. The paper tries to look at people's grievances against these series of dams including the impoverishment risk of landlessness and social disarticulation in the state of Assam. Again, the paper attempts to assess the impact of displacement on livelihood security over tribals and women of the region. Moreover, it tries to analyze the policy loopholes for resettling and rehabilitating displaced people as well as suggest some workable ideas and reconstruction model to tackle the problem of displacement.

Keywords: Displacement, Impoverishment Risks, Rehabilitation, Social Disarticulation, landlessness, Community Reconstruction.

[1] Assistant Professor, Department of Political Science, Silapathar College, Silapathar
Email id: madhusmitadevi27@gmail.com

Introduction

"…..next to killing a man, the worst you can do is to displace him."----Thayer Scudder.[i]

Northeast India consists of eight states- Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura. The region is connected with the rest of India through a narrow corridor, popularly known as '*chicken neck'*. The region is well known for its biodiversity hotspot all over the world. Arunachal Pradesh has been recognized as World's second cultural biodiversity hotspot. Assam, one of the Northeast Indian states (24.30 N and 280 N latitude and 89.50E and 96.10E longitude) presents a majestic landscape characterized by stunning hills, sprawling valleys and mighty rivers enriched by diverse vegetation and forest cover. The state is recognized as one of the important biodiversity spots of the country with its rich heritage of flora and fauna.[ii]

Despite innumerable natural resources, this region has always been treated as the periphery of 'mainland' India. The region has to face environmental degradation in the forms of unprecedented floods, landslides, earthquakes, etc. Especially, the devastating earthquake of 1950 changed the topography of the region, particularly in Upper Assam. In this backdrop, development has remained a subject of contestation for India's North East.[iii]

Table-1.1
Hydroelectric Power Potential of North East India

States	Total hydroelectric power (in megawatt)	Percentage of total power potential of ne India
Assam	351	1.10
Arunachal Pradesh	26,756	83.99
Meghalaya	1,070	3.36
Manipur	1,176	3.69
Tripura	9	0.03
Mizoram	1,455	4.57
Nagaland	1,040	3.26
Total	31,857	100.00

Source: Anon 2004, Presentation to the Union Power Ministry, National Hydroelectric Power Corporation (NHPC), Delhi.

But the situation has started to change gradually since the 1970s onwards. A ministry of "Development of North East Region" (DONER) has been created at the Centre. Due to 'geographical space' abundantly available in this region the Government of India has decided to make this region as 'powerhouse of India'. Hence, the Centre has approved 168 dams including both mega dams and small dams to be built in the region. Among them a few have been completed and many more are in the pipeline. The task of constructing these dams have been vested in the hands of the National Hydroelectric Power Corporation (NHPC), North

Eastern Electric Power Corporation (NEEPCO), the Brahmaputra Board and State Electricity Boards. According to the deal, the host state would receive 12 per cent out of the total power generated freely. For this reason state governments usually do not raise any questions against such mega dams. The following table will give a picture of the potentiality of North East India to generate hydroelectric power.

The journey of dam proliferation has been started from 2001 onwards in the North Eastern region of India. In 2001, the Central Electric Authority (CEA) has conducted its preliminary ranking study on the potentiality to generate hydroelectricity amongst Indian states. In this survey, the Brahmaputra river basin has been awarded the highest marks. The Brahmaputra river system includes Barak and other south flowing rivers like Teesta, Subansiri, Kameng, Kalang, Dihang, Dibang and Lohit.[iv] The North Eastern region of India is not suitable for mega dams from the dimension of geographical location. The entire region is located in a fragile geographical position (seismic zone -5) which itself expresses the risk factor that the downstream communities shoulder. There is every possibility that powerful earthquakes may destroy the structure of river dams resulting in an uncontrolled release of water from the big reservoirs. Consequently, the flash flood may bring unprecedented danger to the downstream inhabitants. The north east India is known for its large variety of flora and fauna. The consequence of flood will result in sedimentation of rivers which in turn will collapse rich collection of flora and fauna in this region.[v]

Objectives

1. To give an overview of the problem of dam induced displacement, rehabilitation and resettlement in Assam.
2. To assess developmental policies and programmes in the region from a gender lens.
3. To scrutinize the main apprehensions of the indigenous people in Assam concerning the hydroelectric projects and the reasons behind it.
4. (a) To assess the impoverishment risks of landlessness and social disarticulation under ‘conundrum of development’.

   (b) To analyze governments’ efforts to resettle and rehabilitate the project affected people in North East India in general Assam in particular.

   (c) To suggest a ‘reconstruction model’ to cater the needs of the dam induced displaced people of the state of Assam.

Methodology

The methodology for the research is purely qualitative as the qualitative method helps in understanding the social reality as it is.

Northeast India has been the theatre of this study. Keeping the socio-economic and political complexities of the region in mind, the study attempts to gather and analyze the literature on existing complex issues. Hence, the study is largely based on secondary sources, such as, books, journals, newspaper articles as well as internet sources. Secondary information, such as press briefings, documents ,and various published and unpublished governmental and non-governmental documents, such as reports published by the Government of India and World Commission on Dam ,etc., is also be analyzed. The methodology also includes a content analysis of the newspaper reporting on a number of hydropower projects in Assam.

Displacement, Resettlement and Popular Resistance in Assam

The northeastern states have a prolonged history of dam induced displacement much before the Central Electric Authority's (CEA) ranking. The state of Assam has witnessed anti dam protest for the first time in the late 1960s against the proposed Pagladiya dam at Thalkuchi village, in the then Nalbari district and presently in the Bodoland Territorial Autonomous District (BTAD). The project site is located near the Indo-Bhutan border. Originally, it was a 'minor flood detention project' for Rs. 12.60 crores based on a report submitted by the Central Water Commission in 1968-71. The Planning Commission of India approved the project as a 'flood control project' at an estimated cost of Rs. 12.80 crores at the price level of 1971-72. Subsequently, the project also included an irrigation element and finalized at Rs. 287.86 crores in the price level of 1988-89. The Brahmaputra Board became the implementing agency of the project in 1984-85. The Government of India appointed a committee to study the potentiality to generate hydroelectricity in the proposed region and the committee submitted the report in November, 1999. Based on that report, The Technical Advisory Committee of the Ministry of Water Resources, the Government of India gave clean sheet to the project in August 1995. Here we have noticed that a 'clean sheet' was given based on the report which has been solely depended on the technical and economic side without taking into account environmental and social aspects. The Ministry of Environment and Forest gave clearance later on. On 29th November, 2000 the then National Democratic Alliance(NDA) government finalized the project at the cost of Rs. 542.90 crore. The project was expected to be completed by 2007. But the question is why the people of Assam vehemently opposed the construction of dam? The answer is-the social and environmental cost associated with the project has been totally overlooked by the insensitive project designers and the government. The project will displace the existing 38 villages and displace more than 5000 families and 50,000 people from their parental land. But the resettlement and rehabilitation (R&R) package of the Brahmaputra Board covers only 3,271 families and 18,473 people. Without demarcating any clear criteria, the R&R package excluded some people whether

they too belong to the same area with those who are included within the R&R package. Hence, the potential displaces, whether entitlement or non entitlement, rejected the R&R package completely. The project will acquire about 34,000 acres fertile agricultural land. As most of the potential displaced families belong to peasant fraternity, acquisition of huge tract of fertile land will invariably bring threat to their lives and livelihoods. Along with the individual property land, the project will submerge 4 high schools, 13 middle schools, 40 primary schools and several primary health care centres, temples, *Naamghars* and other places of worship but the R&R package includes no high school, 3 middle schools and 7 primary schools. A total of 8,000 bighas of land has been allotted by the Government of Assam to resettle the potential displaced people. Unfortunately, the relocation site has already been occupied by the East Pakistan(Bangladesh) refugees. In a densely populated district, the task of resettling a huge number of people at one location is a herculean task. Due to the absence of vacant land in the plains, the government is bound to resettle them into different places which will invariably lead to fragmentation of community life styles. Apart from quantum of land, the people are skeptical about the quality of land too, because land is the backbone primarily for the peasants.[vi] There are some another dimensions. In the R&R package, only 0.13 hectares or 1 bigha of land has been assigned to each family as homestead land. But the village people mostly depend on cattle economy. They need cowshed for raising their cows. They need farms for maintaining pigs, goats, poultry or dairy. The R&R package is silent in this matter. While the government conceived the project as 'flood control project' the harsh reality is that the project site is not a flood-prone area. Besides, it is a very fertile area. Therefore people questioned the transparency of the project. They have also apprehension about their future- i.e. what will happen if they will be pushed into another flood prone area in the name of 'flood control project'.[vii] Since most of the potential displaced are tribal people, particularly *Bodos,* many of them lacked legal title to land *(myadi patta*)and hence accelerated their apprehension of 'no compensation'. A people's resistance committee, known as 'Pagladiya Bandh Pratirodh Committee' was formed in 1968-69 under the chairmanship of Mukundaram Medhi during the time of the first investigation for the dam. This protest movement is very significant because it was conducted just after two decades of independence, when the mega dam projects were worshipped or regarded as 'temples of development' and that too by those people, mostly illiterates lived in the peripheral region of the country. The AGP put pressure on the Government of India to continue the project in 1987. In the same year, the potential displacees formed an organization, titled, 'Pagladiya Bandh Prokalpar Khatigrasta Alekar Sangram Samitee' to give an organizational shape to their movement. Since the project site is mostly dominated by Bodos, the resistance movement was fully supported by the All Bodo Students' Union (henceforth ABSU). Now this whole area comes under the jurisdiction of

Bodoland Territorial Autonomus District (BTAD). On 29th October 2002, thousands of villagers came to Dispur, the capital of Assam to demonstrate their *Dharna* peacefully, but they were not allowed to enter into the city. Their entry was being restricted at Amingaon by the police forces through the means of *lathicharge* and tear gas. However, some elite tribal leaders managed to take part in the *Dharna* including activists of ABSU, All Bodo Employees' Federation(ABEF), All Rabha Students' Union (ARSU) and MPs and MLAs of Bodoland Demand Legislative Party. On 17th September, 2002 people protested against poor quality of model house being built by the Brahmaputra House. The Board allotted Rs 12,462 for each model house but the constructed one would never cost more than Rs. 3000. The widespread corruption made people frustrated at the project implementing agency. On 29th January 2004, officers from the Brahmaputra Board arrived at the project site i.e. Thalkuchi village to do land survey. The potential displacees consisting of around 6,000 families and 40,000-50,000 people blocked all roads and restricted the entry of the officials. After 35 days of face to face confrontation, the government officials and the police had to go back without completing land survey. This was a big victory for the 'voiceless people' and a great loss for the 'all powerful state'. Due to the lack of any prominent elite leader, the movement did not get adequate media coverage. Only few Assamese dailies have covered the protest movement of 29th& 30th January, 2004. No national media came forward to telecast the issue. But the government is still trying to revive the project. It is still a part of the state agenda.[viii] The realization of dam induced environmental and social hazards has been felt by people from the 21st century onwards especially in the northeastern states. Prior to it, dams have been considered as *'temples of development'*. Hence, in 1988, Asom Gana Parishad (AGP), the first regional party government of Assam has demanded a memorandum to the then Prime Minister of India demanding several multipurpose hydel projects for this region in order to control floods to a greater extent as well as to generate cheap hydroelectric power for the whole northeastern region. But subsequently AGP has changed its position when Government of India has come up with a number of mega hydropower projects for this region in 2001.[ix]

Another controversial mega dam project of the region is Karbi Langpi Hydroelectric Project which was completed in 2007. The dam site was located in the hilly Karbi Anglong district in Assam as well as over the river Barapani. The dam is expected to generate 100 MW power for the region. The dam was commissioned in 1979 and it took 28 long years for completion. Being located at the high altitude of Baithalangso under Hamren subdivision in west Karbi Anglong, the dam is posing a serious threat to the local population due to the massive soil erosion in the catchment area of the main feeder. They blame the Forest department (Hamren division) for not taking up large-scale plantation and conservative measures in the catchment of the river before actual commissioning

of the project, although crores of rupees were allocated by the Power sector to the Forest department. The indigenous people have directly blamed the Assam State Electricity Board for being corrupt, non transparent, non accountable as well as inefficient.[x] The Displaced People or Project Affected Peoples of Karbi Langpi came to know about the dam from project officials when they were already measuring their land. The state made no effort to give them the information in a manner that could have prepared them for the eventuality of livelihood loss. Most DP/PAPs got the information much after the project had been announced, when the initial work had begun. The project officials gave them no information through an official communication. The radio, newspapers or notifications can give the people the news about the project but very often the notification is published in the national English dailies or regional language papers to which the villagers do not have access, both because of the distance and the language.[xi]

Prior to 2001 that means before the Brahmaputra river basin has been awarded highest marks for potentiality to generate hydroelectric power, people of Assam started to hear the news of 2,000 MW Lower Subansiri Hydroelectric Project (LSHEP) at Gerukamukh under National Hydroelectric Power Corporation (NHPC). Gerukamukh was located in the Dhemaji district of Assam and also Assam–Arunachal Pradesh foothills in the lower part of the river Subansiri. The 90 per cent of the project area comes under Arunachal Pradesh and only the remaining 10 per cent comes within the territory of Assam. The total requirement of forest land is 4039.3 hectares, out of which 3183 hectares are in Arunachal Pradesh and 856.3 hectares are in Assam.[xii]

Both the governments and NHPC underestimated not only social aspects but also environmental issues. The northeastern region is well known for its rich biodiversity all over the globe. Arunachal Pradesh has recognized as World's second cultural biodiversity hotspot. But the NHPC has nothing to do with the protection of natural resources in the region. Therefore, in spite of continuous warnings by the 'threatened people,' the natural elephant corridor i.e. 'Dulung Elephant Corridor' that came between Assam-Arunachal Pradesh foothills was being blocked by the NHPC in the name of constructing the dam which resulted into conflict between men and elephants. The local people condemned NHPC for not showing respect towards their cultural and religious beliefs. *The Assam Tribune*, on 7th April 2005, had reported the demolition of an old *Naamghar* and an ancient holy site of elephant worship at Geruka Nalah without prior consent of the local people.[xiii] The project implementing agency NHPC identified 77 people as Project Affected People. According to them, all 77 project affected people belong to ST community from two villages namely, Gengi and Siberite in West Siang district in Arunachal Pradesh. The survey of the Gensi village of Likabali Sub-division of West Siang District reveals that two villages of Lower Subansiri district of Arunachal Pradesh, viz; Gangi and Nsiberite, have been severely

affected by the dam. According to the research, 116 families consisting of 1094 people in these two villages are severely affected. Amongst 116 families, 29 lost agricultural land while their homestead remains untouched. A total of 1225 hectors of private land have been acquired which made the affected people to move to other villages far away from their original village. The river Subansiri is their lifeline. Their entire lifestyles-economic as well as cultural revolves around the river. Therefore, it becomes difficult for them to start a new live far away from the river both from financial as well as cultural point of view. It becomes difficult to rely on *Jhum* cultivation and *Paani Kheti*(deep water rice cultivation) and common property resources like bamboos and timber due to acquisition of agricultural and private land.[xiv]

Amidst enormous public protests the Government of Assam appointed an expert committee in order to assess downstream impact of the Lower Subansiri Hydropower Project in 2008. The Government of Assam asserted that it would follow expert committee's recommendations accordingly. In the meanwhile, the Government of Assam has also constituted a committee consisting of members of Assam Legislative Assembly. Both the committees asked NHPC not to proceed further unless and until final report has not come. But neither NHPC nor Government of Assam listens to it. When the final report was submitted in August 2010 the Government of Assam immediately withdrew its earlier position and called for an 'international expert team' as the final report of the expert committee questioned selection of the dam site as well as its downstream effects. In other words, the government has tried to 'buy' experts in order to publish reports in favour of the government. This whole phenomenon has been described as 'politics of expertise' by renowned social scientist Sanjib Baruah.[xv] However, civil society organizations and NGOs of both Assam and Arunachal Pradesh such as KMSS, AJYCP, All Mising Students' Union blocked the National Highway 52 in order to prevent all materials to the dam site. Therefore the construction has been stopped since December 2011.

Meanwhile, after the new Bharatiya Janata Party-led Union government assumed power in Delhi in May 2014, it adopted a policy to fast track the necessary forest and environmental clearance process of many development projects throughout the country. Under this policy, the FAC met twice on 22 and 23 September 2014 and cleared the Dibang Hydel Project despite opposition from within it. This led local activists to accuse the Government of India of bulldozing local concerns. They accused the dam builders of corrupting the small local communities with promise of financial compensation. That is why, they argued, there was no visible public protest after the September clearance of Dibang Hydel Project. It has been pointed out that the dam will submerge 4,577.84 hectares of biodiversity rich forest area with several endemic species in Arunachal Pradesh, and will entail severe impact in downstream areas, primarily in Dibru-Saikhowa

National Park, a rich biodiversity hotspot in Assam. However, six years after its foundation stone was laid and twice denied environmental clearance, the 3,000 MW dam was cleared by the FAC, subject to a reduction in the dam height by 20 m from the originally envisaged 288 m. This clearance for India's largest hydro-project and the world's tallest concrete gravity dam came allegedly after a letter on 3rd September 2014 from the prime minister's office to the secretary of MoEF to 'clear the project expeditiously'. Incidentally, of the six FAC members who cleared the project, four were also part of the panel that had unanimously rejected the project in April 2014.[xvi] Thus it was seen that the whole issue of dam construction is a politically driven issue.

In order to convince the uprooted people or tend to glorify the projects, the government makes promises of better infrastructure facilities in the relocation sites but all such promises go in futile. The basic requirements of life, such as, schools, hospitals, houses etc. were provided with such a poor infrastructure that people are bound to leave relocation sites. The Ranagadi Hydroelectric Project in Arunachal Pradesh which has failed to generate its estimated electricity of 172.4 MW, also failed in providing free electricity to the uprooted people.

Impoverishment Risk of Landlessness

In order to comprehend inevitable consequence of displacement, Michael Cernea[xvii] developed a theoretical model of 'Impoverishment Risk and Reconstruction' for uprooted people. According to this model, the displaced people will face eight inevitable risks, such as, landlessness, joblessness, homelessness, marginalization, food insecurity, increased morbidity, loss of access to common property resources and community disarticulation which push them into the state of acute poverty and destitution. Since these risks were inevitable, bold steps should be taken by the project designers and policy makers 'to attack those risks and prevent them from becoming reality.' Cernea's model has not been confined to discussion of problems or risks. Rather he has identified various workable guidelines for reconstruction. His model has been applied upon almost 200 dam projects funded by the World Bank in 1993-1994.[xviii] If the trends towards impoverishment is not detected in time and no corrective measure is taken for their containment, these potential hazards shall become actual impoverishment disasters.[xix]

The internal logic of IRR model suggests that to prevent and overcome the patterns of impoverishment, it is necessary to act in time to attack the risks and stop them from becoming reality. Risk identification is not an exercise carried out for academic purposes; it is carried out to design for action, for risk reversal. Thus, he has identified certain reconstructive measures, such as-

(i) From landlessness to land based resettlement

(ii) From Joblessness to reemployment

(iii) From homelessness to house reconstruction

(iv) From disarticulation to community reconstruction

(v) From marginalization to social inclusion

(vi) From expropriation to restoration of community assets/services

(vii)From food insecurity to adequate nutrition

(viii)From increased morbidity to better health care.

Although Cernea has developed this model in the context of USA, but the model has general applicability in terms of displacement all over the world. Various studies have conducted regarding feasibility of this model in case of development induced displacement in different parts of the globe.

> *"Expropriation of land removes the main foundation upon which people's productive systems, commercial activities, and livelihoods are constructed. This is the principal form of de-capitalization and pauperization of displaced people, as they lose both natural and man-made capital."*- Michael. M. Cernea[xx]

Landlessness is caused by acquisition of land and it has very serious social and economic consequences not only for displaced persons but also for their families and others who depend on these lands (e.g., agricultural labour, tenants and share croppers).[xxi] Land enables them to grow food for subsistence and cash crops with which to obtain money to buy essentials. Agriculture supports over two-thirds of India's billion people, and land accounts for two-thirds of the value of all assets in rural areas. In rural India those who control land also control the major sources of income as well as other institutions.[xxii] If a farmer loses his primary occupation, he also reduces wage and ancillary employment for others. Landlessness not only affects the owners of land but also his family, children, as well as future generations because land provides hidden employment for every member of the family. Therefore, expropriation of land invariably pushes people into the state of acute impoverishment.

Dam Induced Risk of Social Disarticulation

The social fabric of Assam reflects profound diversity. The region is home to a large number of ethnic and linguistic groups. A distinctive feature of the society of Assam is the presence of large number of tribal communities with a complex blend of customs and traditions. But a detailed sociological study on a number of dam projects in northeast India finds various manifestations of social disarticulation within the kinship system due to scattered re-location, such as the loosening of intimate bonds, growing alienation and anomie, the weakening of control on interpersonal behavior, and lower cohesion in family structures.

Marriages are deferred among indigenous tribal people because dowries, feasts, and gifts become unaffordable for them. Resettlers' relationships with non-displaced kinsmen are eroded and interaction between individual families is reduced. As a result, participation in group activities decreases; post-harvest communal feasts and pilgrimages are discontinued, and common burial grounds become shapeless and disordered.[xxiii] In the words of Michael Cernea-

> *"Forced displacement tears apart the existing social fabric. It disperses and fragments communities, dismantles patterns of social organization and interpersonal ties; kinship groups become scattered as well. Life sustaining informal networks of reciprocal help, local voluntary associations, and self-organized mutual service are disrupted. This is a net loss of valuable "social capital," that compounds the loss of natural, physical, and human capital (discussed previously). The social capital lost through social disarticulation is typically unperceived and uncompensated by the programs causing it, and this real loss has long term consequences."*[xxiv]

Social disarticulation is less measurable than landlessness and economic marginalization, but nevertheless real and profound. This part requires more sensitivity from the project designers. In many instances, especially in a tribal dominated region like northeast India, the age long cultural beliefs, customs and norms of a community had collapsed in the name of 'development'. The government should make all possible attempts to resettle the whole community in one site rather than scattered relocation. It is not acceptable to extinction of any cultural faith or practices due to 'national development'.

Tribals in North East India-the Worst Victims of Development

North-East tribes constitute a major part of the Indian tribal community. They are all scattered over all the states of North East. Some examples of prominent tribes are Garo, Khasi, Jaintia, Adi, Nyishi, Angami, Bhutia, Kuki, Rengma, Bodo ,and Deori. They are scattered throughout the region. Christian-ism is followed among many of the tribes and some also follow Hinduism and Buddhism. The rest still have their indigenous beliefs and practice animism. Among the oustees, indigenous people or the tribals (ethnic minorities) are the most victims in the whole episode of displacement. In India 40 to 50 per cent of those displaced by development projects were tribal people, who account for just 8 per cent of the 1 billion.[xv] Their identity has been very much attached to their ancestral land and they have developed a close emotional and spiritual bond with it. Their very basic existence relies on forest and forest products like fruits, fuel, fodder and fiber. Their livelihoods depend on fishing, shifting cultivation (*jhum)* and hunting. In many instances, these tribal people do not even have formal rights or legal rights to the area on which their daily survival is connected! Due to the lack of legal

title to land (*myadi patta*) the tribal people are often deprived of compensation from the government. The lack of modern skills coupled with almost non-existent official efforts to facilitate an easier entry into the dominant economy, pushes a majority of tribals into conditions of servility and bondage. Being predominantly poor, illiterate, ignorant and isolated it becomes very difficult for them to mingle with the new people in the new environment. Nowadays, the government provides cash compensation to the uprooted people due to scarcity of land. But the cash compensation makes the illiterate tribal people more impoverished. Still today, many tribal communities in the region are not well accustomed to the market economy. Therefore, they negatively spent the compensation money purchasing unhealthy products.[xxvi] Neither the government nor the project implementing agency sees compensation as their ethical or moral responsibility rather they take it as their 'undue responsibility' and they just want to finish it by any means without taking into consideration further consequences.

Women-the 'Second Sex'

Although women form a large proportion of the displaced, little or no attention is paid to them by both the concerned authorities and the displaced male population. This phenomenon has been called 'double bind' by Lyla Mehta. Speaking to the project affected women, one realizes how severely they are affected and how little their fears were appreciated, particularly by the men and whose main concern was a loss of their lands and livelihood. In agronomy, women had ample of works attached to the land and house. They were feeding their cattle, picking the wood from the forest, working in the agricultural land and had other allied household activities. They were working shoulder to shoulder with their husbands and assisting them in all their requirements. In a way, women were the pillars of strength for the house as well as the menfolks living in society. But in the new economic system, due to the acquisition of agricultural land and the destruction of the village set up, women had no work to do. Families, which earlier used to be the production units have reduced to the level of consumption unit. Women have become idle and dependent on this system. Even if some of them were working, that was not in their area of specialization, but in the labor-intensive jobs attached to the plants and townships. Some others became maid in the Project Township and few unfortunates had to beg to feed her stomach. This led to a sharp decline in the status conferred to the women, as they were enjoying earlier. The Dowry system has also taken a sharp expansion. As a result, the birth of a girl child has become a curse for the household.[xxvii]

The women are responsible for collecting food, fuel, fodder and water in most of rural India. It is an arduous task even in normal circumstances, given the present conditions of deforestation and environmental degradation. They have worries about how these needs would be met after displacement. Experience from various studies has proved that their fears are not ill-founded. The dams have

monopolized the water, which in any case was too polluted to be used, and the mining operations have taken over the forest. Even the wells have been polluted by the coal and cement dust and gravel. Since no alternative toilet and sanitation facilities have been provided, their lives are made all more complex.[xxviii]

Because women in the tribal- dominated region are much less mobile than men, the breakdown of the village and social units affects them much more severely. The fact that she might be leaving relatives and friends behind, or may never again meet her daughter, who is married into a village which will not be displaced, is a great cause of concern for the woman, a fear that cannot easily be brushed aside.

Most importantly, very few women own property or have land *pattas* or legal title in their name. They are, therefore, seldom entitled to compensation. It is the adult male who is considered to be the head of the family in the case of joint holdings. In the definition of policy, the family includes husband, wife, minor children and other persons dependent on the head of the family, like a widowed mother. But the question is, what happens to a woman who is the head of the family, or a single woman or a widow with minor children?[xxix]

The policy makers and project designers think that man embraces woman. Nevertheless, it is disheartening that even today, our planners regard women as mere dependents on men!

Findings

From the above discussions, the study tries to find out why the policymakers and project designers fail to prevent or minimize development induced displacement even in the 21st century:-

- ***Technical concern****:* The project designers and planners emphasizes the technical or mechanical sides of the dam. They do not show their concern for the humanistic side. They do not feel any necessity to interact with the potential displaces. Their voices are not taken into consideration.
- ***'Corrupt practice' of public hearing****:* The recorded public hearings are fraudulent. The dates of the public hearings are fixed in the files but in most cases, they are not transparent. They never inform the public about the mandatory nature of the hearing.
- ***Manipulation of Environment Impact Assessment's Report:*** An Environmental Impact Assessment (EIA) is mandatory before starting of any project. But NHPC and NEEPCO always conduct such EIA when the project is either under construction or in nearing completion. In order to get favorable reports, the dam authorities always conduct such a survey with 7 km downstream, whereas according to the law, such a survey needs to be conducted within minimum of 100 km downstream.

- ***Gender biased rehabilitation & resettlement action plan:*** the very definition of 'rehabilitation' and 'resettlement' is used in narrow senses in the National Policies on Rehabilitation and Resettlement. Compensations are given in the names of the male head of the household. Hence, unmarried women or single women become the worst victims of displacement. Again, no compensation is given for the loss of Common Property Resources (CPR).
- ***Corruption in the construction of model houses***: the construction of the model house for the displaced people encompasses widespread corruption. Usually, the implementing agencies allot a standard amount of money for each model house which has been occupied by the middle men.
- ***Breakdown of community structures***: The age -long community lifestyle has come to an end as a result of scattered resettlement of the displaced people. Again in some cases, the displaced people were relocated in one place and the cultivable land allotted elsewhere. But there is no mention of providing transportation costs involved in agricultural activities in the National Policies on Rehabilitation and Resettlement.

Recommendations

After finding out the above mentioned reasons for the failure of minimizing displacement, the researcher would like to give some workable suggestions to tackle the problem of displacement.

- ***Democratic measure:*** Whether the project is major, medium or minor, the voices of the project affected people should be taken into consideration at the very beginning.
- ***Gender- neutral:*** the policies must be gender-neutral. Development cannot occur by keeping one section of the population in a state of negligence and ignorance.
- ***More funds for rehabilitation:*** According to a survey conducted by the CSE, only as little as 1 percent of the total cost of the dam project in India has gone towards rehabilitating the displaced people.
- ***Desire to take responsibility:*** the project authorities should take the responsibility of resettlement as their 'own,' instead of dumping the job on local authorities. The local authorities have generally lacked the professional capacity to cope with such challenges.
- ***Inter-state tribunal:*** there is a need to set up inter-state tribunal if the project involves more than one state because, though each state wants to

maximize the benefits of the proposed project, no one wants to share the responsibility of rehabilitating the people consequently displaced.

- ***Separation of authority:*** there should be a strict separation of authority between project implementation and rehabilitating the oustees, because, since the main interest of the project authorities is in the speedy and successful implementation of the project, they cannot help but see the resettlement of the oustees as a secondary task and hence do not pay sufficient attention to it.

Conclusion

It is time that serious attention is devoted to translating the theoretical construct into a form that those involved in rehabilitation and resettlement operations find usable. Any resettlement agency that ignores risk analysis incurs the risk of perpetuating the impoverishment process which otherwise can well be halted. Our policymakers and project designers should frame the policies by adopting the humanistic approach. Policies should be gender neutral. Instead of mega hydroelectric dams, the government should emphasize building small dams that promote least number of displacements so that they can be resettled and rehabilitated quickly and properly.

Sustaining rivers and livelihoods by understanding, protecting and restoring ecosystems at the river-basin level is vital to promote equitable human development and the welfare of all. Given the fact that large dams have far-reaching consequences, it is imperative to integrate the issues of equity, distribution, rights and social justice in the planning and execution frameworks of the development process to obliterate the inequities inherent in the present frameworks. The Brahmaputra river system provides the backbone for the economy and the society of Assam is instrumental for the sustenance of livelihood of the people of the valley. Utilizing its resources for the potential development of the region and the country is welcomed but not without an integrated approach taking into consideration the societal aspects, environmental aspects, geopolitical and economic aspects of the region. The Brahmaputra is the soul, the essence of the people of the valley.

Endnotes

[i] Scudder, Thayer. (1995). Ecology and Equity: Passing on the Costs, Penguin, New Delhi, P. 71.

[ii] Bhagabati, A., Bora, A. K. & Kar, B. (ed). (2001). Geography of Assam. Rajesh publications, New Delhi, P. 36.

[iii] Hussain, Monirul. (2007). Interrogating Development: State, Displacement and Popular Resistance in North East India. SAGE publication, New Delhi, P. 100.

[iv] Goswami, D.C. and Das, P. J. (2003). "*The Brahmaputra river, India*" in The Ecologist Asia" ,vol 11, pp: 9-14.

[v] Dutta, AkhilRanjan. (2011). *'Political Theory: Issues, Concepts and Debates'* (edited), ArunPrakashan, Guwahati, P. 226.

[vi] Hussain, Monirul. (2007). Interrogating Development: State, Displacement and Popular Resistance in North East India. SAGE publication, New Delhi, pp: 133-134.

[vii] Dutta, Akhil Ranjan. (2003) Pagladiya Project: Poor Rehabilitation of Oustees, *Economic and Political Weekly*, 5152.

[viii] Hussain, Monirul. (2007). Interrogating Development: State, Displacement and Popular Resistance in North East India. SAGE publication, New Delhi, pp: 139-143.

[ix] Sharma, Chandan Kumar. (2018). Dam, Development and Popular Resistance in North East India, *SAGE journal*, volume 67.

[x] The Assam Tribune. (2014). Karbi Langpi Dam Posing Threat to Public, September, P. 10.

[xi] Fernandes, Walter & Bharali, Gita. (2011) 'Uprooted for Whose Benefit? Development Induced Displacement in Assam 1947-2000', North Eastern Social Research Centre, Guwahati, pp: 253-266.

[xii] Sharma, Chandan Kumar. (2018). Dam, Development and Popular Resistance in North East India, *SAGE journal*, volume 67, P. 6.

[xiii] The Assam Tribune. (2005). 'Naamghar Destruction by NHPC Condemned', 9th April.

[xiv] Hazarika, Dr. Pallavi. (2017). 'Internal Displacement in Arunachal Pradesh' published in International Journal of Humanities and Social Science Research; 3 (2), pp: 13-14.

[xv] Baruah, Sanjib. (2012). Lower Subansiri and the politics of expertise. The Assam Tribune, January 22, 4.

[xvi] Sharma, Chandan Kumar. (2018). "Dam, Development and Popular Resistance in North East India", published in SAGE journal, volume. 67, pp: 11-12.

[xvii] **Michael Cernea:** Michael. M. Cernea is a sociologist and anthropologist born in 1931 in Romania who reestablished himself in the USA in 1974 where he has since lived. He is widely recognized for introducing sociological and anthropological approaches into the World Bank. He worked as the World Bank's Senior Adviser for Sociology and Social Policy until 1997. He has also served as Senior Social Adviser to International Organizations such as the UN, OECD, UNDP, FAO, etc on social policy, development, cultural and poverty issues. Cernea has lectured in Universities in the USA, Europe, India, Japan and China. Harvard University invited him as Visiting Scholar in its Department of Anthropology in the academic year 1990-1991. He was also Research Professor of Anthropology and International Affairs at George Washington University. He has authored and edited many books on sociology of development, on social change, population displacement and resettlement, impoverishment and poverty reduction, etc, such as, 'Involuntary Resettlement in Development Projects: Policy Guidelines in World Bank-financed Projects'(1988),'Using Knowledge from Social Science in Development Projects'(1991), 'Sociology, Anthropology and Development'(1994), 'The Risks and

Reconstruction Model for Resettling Displaced Populations'(1996), 'Cultural Heritage and Development: A Framework for Action in the Middle East and North Africa'(2001), etc. He has received several awards like 'Solon T. Kimball Award' for public policy and applied anthropology; 'Vasile Conta Prize' from the Romanian Academy; 'Omnia Opera Prize', 'Bronislaw Malinowski Award', etc.

[xviii] Cernea, Michael (1990)*Impoverishment Risks, Risk Management and Reconstruction: A Model of Population Displacement and Resettlement,* The paper is presented to the UN Symposium on Hydropower and Sustainable Development, Beijing, P.4.See https://commdev.org

[xix] Mathur, Hari Mohan (1998) "*The Impoverishment Risk Model and its Use as a Planning Tool*" published in the book 'Development Projects and Impoverishment Risks: Resettling Projects-Affected People in India, edited by Hari Mohan Mathur and David Marsden, Oxford University Press, Delhi, P.68.

[xx] Cernea, Michael (1990) "*Impoverishment Risks, Risk Management and Reconstruction: A Model of Population Displacement and Resettlement"*, The paper is presented to the UN Symposium on Hydropower and Sustainable Development, Beijing: 15.

[xxi] Cernea, Michael (1991) "*Involuntary Resettlement: Social Research, Policy and Planning*", in Michael M Cernea (ed.), 'Putting People First: Sociological Variables in Rural Development, Oxford University Press, New York, P. 34.

[xxii] ibid

[xxiii] Baboo, Balgovind. (1992). Technology and Social Transformation: The Case of the Hirakud Multi-Purpose Dam Project in Orissa. Concept Publishing, New Delhi, pp: 123-24.

[xxiv] Cernea, Michael. (1990). Impoverishment Risks, Risk Management and Reconstruction: A Model of Population Displacement and Resettlement. The paper is presented to the UN Symposium on Hydropower and Sustainable Development, Beijing, P. 23.

xxv Fernandes, Walter. (2004). Dams and Displacement Woes, *The Statesman*, 15th July 2004, P. 4.

[xxvi] Parajuli, Pramod. (1991). Power Knowledge in Development Source- New Social Movements and the State in India. *International Social Science Journal*, Feb, P. 180.

xxvii Fernandes, Walter. (2004). Dams and Displacement Woes, *The Statesman*, 15th July 2004, pp: 6-7.

[xxviii] Fernandes, Walter, J.C. Das and S. Rao. (1989). Displacement and Rehabilitation: An Estimate of Extent and Prospects, *Development ,Displacement and Rehabilitation*, Indian Social Institute, New Delhi, P. 28.

[xxix] Thukral, Enakshi Ganguli and Singh, Mridula. (1995). Dams and Displaced in India published in the book *Development, Displacement and Resettlement: Focus on Asian Experiences*, Vikas Publishing House Pvt. Ltd, New Delhi, P. 115.

Bibliography

Baboo, Balgovind. (1992). Technology and Social Transformation: The Case of the Hirakud Multi-Purpose Dam Project in Orissa. Concept Publishing, New Delhi, 123-24.

Baruah, Sanjib. (2012). Lower Subansiri and the politics of expertise. *The Assam Tribune,* January 22, 4.

Bhagabati, A., Bora, A. K. & Kar, B. (ed). (2001). Geography of Assam. Rajesh publications, New Delhi, 36.

Cernea, Michael. (1990). Impoverishment Risks, Risk Management and Reconstruction: A Model of Population Displacement and Resettlement. The paper is presented to the UN Symposium on Hydropower and Sustainable Development, Beijing, 23.

Dutta, Akhil Ranjan. (2003) Pagladiya Project: Poor Rehabilitation of Oustees, *Economic and Political Weekly*, 5152.

Dutta, Akhil Ranjan. (2011) Political Theory: Issues, Concepts and Debates (edited), Arun Prakashan, Guwahati, 226.

Fernandes, Walter, J.C. Das and S. Rao. (1989). Displacement and Rehabilitation: An Estimate of Extent and Prospects, *Development ,Displacement and Rehabilitation*, Indian Social Institute, New Delhi, 28.

Fernandes, Walter & Bharali, Gita. (2011). 'Uprooted for Whose Benefit? Development Induced Displacement in Assam 1947-2000', North Eastern Social Research Centre, Guwahati, 253-266.

Fernandes, Walter. (2004). Dams and Displacement Woes, *The Statesman*, 15th July 2004.

Hazarika, Dr. Pallavi. (2017). Internal Displacement in Arunachal Pradesh, *International Journal of Humanities and Social Science Research.* 3 (2),13-14.

Hussain, Monirul. (2007). Interrogating Development: State, Displacement and Popular Resistance in North East India. SAGE publication, New Delhi, 117.

Parajuli, Pramod. (1991). Power Knowledge in Development Source- New Social Movements and the State in India. *International Social Science Journal*, Feb, 180.

Scudder, Thayer. (1995). Ecology and Equity: Passing on the Costs, Penguin, New Delhi, 71.

Sharma, Chandan Kumar. (2018). Dam, Development and Popular Resistance in North East India, *SAGE journal*, volume. 67.

The Assam Tribune. (2005). Naamghar Destruction by NHPC Condemned, 9th April.

The Assam Tribune. (2014). Karbi Langpi Dam Posing Threat to Public, September 10.

Thukral, Enakshi Ganguli and Singh, Mridula. (1995). Dams and Displaced in India published in the book *Development, Displacement and Resettlement: Focus on Asian Experiences*, Vikas Publishing House Pvt. Ltd, New Delhi, 115.

Man & Development
Vol. XLIII No. 4, December 2021,
http://www.crrid.res.in/journal/
ISSN 0258-0438

AN ASSESSMENT OF BASIC AMENITIES AND QUALITY OF LIFE IN SLUMS: A CASE STUDY OF AMRITSAR CITY

Dharminder Kumar[1]

Abstract: Amritsar is the largest city of Punjab, north India, quantifying on the basis of its slum population. The present paper attempts to study the availability of basic amenities such as safe drinking water, toilet facility, drainage connectivity, fuel used for cooking and availability of electricity and to evaluate the quality of life in Amritsar slums. This study is based on both primary and secondary data which was collected during the period of February- March 2019. In total, 614 households were selected for primary survey on the basis of the location of slums in the city and data were collected using interview schedule. The analysis reveals that there are wide inter-slum differences in the availability of basic amenities and levels of quality of life among various categories of slums on the basis of their location. Public planning agencies have failed to supply basic amenities to the economically weaker sections of the society. In addition to Government efforts, there is need for strengthening the role of private sector in slum up-gradation, participatory planning for slum areas and other inclusive planning measures to ensure basic amenities and better quality of life to the slum dwellers.

Keywords: Basic Amenities, Housing, Informal settlements, Quality of life, Slum, Urbanization.

Introduction

Rapid population growth and low investment in urban development have created a serious deficiency in the availability of basic amenities and facilities in the towns and cities of the country. Public planning agencies have failed to supply developed land to the weaker sections of society resulting in creation of slums in haphazard manner. The word 'slum' is used to describe informal settlements in cities that have inadequate housing and miserable living conditions. Slum is not a new phenomenon as they have been a part of the history of almost all cities. One

[1] Sr. Research Fellow, Department of Geography(CAS), Panjab University, Chandigarh
Email: dksharma002@gmail.com

billion people or one third of the world's population is estimated to be living in either slum or squatter settlements (UN-Habitat, 2003). In 1950, 30 per cent of the world's population was urban, but by 2050, 66 per cent of the world's population is projected to be in urban areas (WUP, 2014). It is clear that a large proportion of the world's urban population is going to be a part of urban space. The largest proportion of population living in slums in the world is in the Asian region, which is also urbanizing at a very fast rate. In 2001, Asia had 554 million slum dwellers, or 60 per cent of the world's total. In South Asia, slum and squatter settlement population constituted 58 per cent of total urban population compared to 36.4 per cent in East Asia and 28 per cent in Southeast Asia. In Southeast Asia, where urban population is 38.3 per cent of the total population, 28 per cent of this urban population is living in slums (Giok & Phua, 2007). Squatter and slum settlements have formed mainly because of the inability of city governments to plan and provide affordable housing for the low-income segments of the urban population. Hence, squatter and slum housing is the only housing solution for low-income urban population (UN-Habitat, 2003). Many slum related studies also focus on the expansion and proliferation of existing slums and emergence of new slums, particularly in the third world countries where rapid growth of slums is linked to the failure of urban planning policies of the government (Kuffer, Pfeffer, & Sliuzas, 2016). In India, approximately 1.37 crores households, or 17.4 percent of urban households lived in slums in 2011. Like other developing countries, India too faces the challenge of making the country slum-free in the coming decades. The new millennium development goal of the United Nations, to which India is a signatory, particularly identifies the need to improve the quality of life in the slums (Tripathi, 2015). In India, unplanned rapid urbanization has resulted in a large number of city dwellers taking up residence in urban slums. City authorities facing rapid urban development lack the capacity to cope with the diverse demands for infrastructural provision to meet economic and social needs. Basic amenities are essential foundation for a decent living and it enhances economic growth and quality of life. The scope of basic amenities include safe drinking water, sanitation, housing, roads, electricity, fuel, connectivity, healthcare, schools, playgrounds and other recreational facilities. There are non-negotiable conditions for living but for last sixty years of planned development intervention, the Government has neglected this aspect without any substantial achievement even today. Unless these basic issues of the poor and the marginalized sections are not solved, it is difficult to ensure inclusive growth in the society. The long time negligence of the Government towards a section of people in a democratic setup questions our very concept of nationhood and the ongoing development process. The living condition of common people reflects the socio-economic, political and environmental development of a country. The poor and marginalized people

living in slums and squatters are denied basic amenities in spite of dedicated schemes and budgetary allocations.

Slums in Amritsar City

Amritsar is one of the largest cities of Punjab and has highest slum population accounting to the percentage of city population. Rapid growth of 8.13 percent from 2001 to 2011 in slum population is recorded in the city (Master Plan for Amritsar, 2010). The major part of Amritsar city has been developed without proper planning and it is evident from the fact that 51 percent of the city area has been developed in a haphazard manner or in unplanned way. The unplanned development has been manifested in the form of walled city, slums and 158 unauthorized colonies in the city (Master Plan for Amritsar, 2010). As on 2011, there were 63 slums notified (All notified areas in a town or city notified as 'Slum' by State, UT administration or local government under any act including a 'Slum Act'- Census 2011) by Amritsar Municipal Corporation, which comprise 29.33 percent of population to the total population of the city (See Table 1). Slum population in Amritsar increased from 5.53 percent 1981 to 29.33 percent in 2011 (Sandhu & Sekhon 2017). With regard to ownership of the slum land, 89 percent of the slums in the city exist on the private land whereas in some cases the land has either been encroached or has been purchased from land owners and the remaining 11 percent of the slums exist on the Municipal Corporation lands which are mainly located on the southern part of the city. It is usually observed that majority of slums come up on government land but in case of Amritsar, most of the slums are on private land.

Table-1
Growth of city and slum population, Amritsar city (1981- 2011)

Years	City Population	Slum Population	Slum Population as percent of city Population
1981	589299	32632	5.53
1991	708835	123000	17.35
2001	966862	229603	23.74
2011	1132719	332274	29.33

Source: Census of India, 2011

Materials and Methods

Study Area

Amritsar, literally a pool of Nectar, derives its name from Amrit Sarover. The city of Amritsar lies at 31°07‟ and 32°03‟ North latitude and 74°29‟ and 75°23‟ East longitude with an average elevation of 234 meters (768 ft.) on the Grand Trunk Road only 27 kms from the Indo-Pak International Border. The city is situated in a depression in the middle of the Bari Doab, with a population of 1,132,761 persons (Census of India, 2011). Amritsar has been served by a

Class I municipality since 1868, which was upgraded to Municipal Corporation in 1977. The Municipal Corporation of Amritsar is governed by the Punjab Municipal Corporation Act, 1976. The total area of the Municipal Corporation Amritsar is 139.58 sq. km, out of which 105.86 sq. kms is developed and 33.72 sq. kms is undeveloped. It is one of the 22 district headquarters of Punjab and is the second largest city in Punjab, after Ludhiana. The city lies on the main Grand Trunk Road (GT Road), also known as National Highway 1 from Delhi to Amritsar connecting Lahore in Pakistan, and therefore is very well connected to the road network. Amritsar is also very well connected by rail to almost all major cities in India.

Objectives

The present study attempts to assess the availability of basic amenities in notified slums in Amritsar city. The aim of the paper is to add to the existing knowledge base regarding the availability of basic amenities in slums of Amritsar using latest primary data. This paper also is an attempt to analyse the levels of Quality of life in slums. The study was carried out in Amritsar city with a population of 1,132,761 according to census of India, 2011 among which 29.33 percent of population is living in slums.

Data Sources

The present study is based upon both primary and secondary data. The primary data have been collected with the help of a structured interview schedule and the schedules are administered personally by the researcher. The stratified random sampling method is used to achieve major objectives for this study and primary survey has been conducted in notified slums of Amritsar city during February-March 2019. Secondary sources of data include data and publications from Census of India including Primary census abstract for slums 2011 and District census handbooks, Ministry of housing and urban poverty alleviation, Punjab urban planning and development authority (PUDA), Amritsar development authority (ADU), Municipal corporation of Amritsar, Town and country planning department, Punjab and other related government departments.

The Sample

As the first step, six-fold classification of Amritsar slums on the basis of their location is taken up as the base. Secondly, slums from each category have been taken proportionally according to their percentage share in total slums. The nine sample slums in six major categories are included in primary survey: (1) Chhota Haripura (2) Angarh (3) Dhapai (4) Ekta Nagar (5) Ram Talai (6) Maqboolpura (7) A/O Gilwali gate (8) Fatehpur (9) Ghanupur (See Table 2). Lastly, 5 percent households were selected for primary survey in each slum and an in-depth survey of 614 households was conducted through interview schedule to determine basic amenities and level of quality of life.

Table-2
Selection of sample size

S. No.	Slum Category*	Name of the sample slum	Population	Total household	Sample household
1.	Slums along Railway line	1. Chhota Haripura	8300	1660	83
		2. Angarh	3850	770	39
2.	Slums along Major roads	3. Dhapai	8800	1760	88
		4. Ekta Nagar	2300	460	23
3.	Walled city slums	5. Ram Talai	3300	660	33
4.	Industrial slums	6. Maqboolpura	11000	2200	110
5.	Refugee slums	7. A/o Gilwali gate	1000	200	10
6.	Sporadic slums	8. Fatehpur	5550	1110	56
		9. Ghanupur	17160	3432	172
		Total	61260	12252	614

Source: Municipal Corporation, Amritsar
Notes: Categorization of slums has been done by the researcher on the basis of location of slums in Amritsar city.

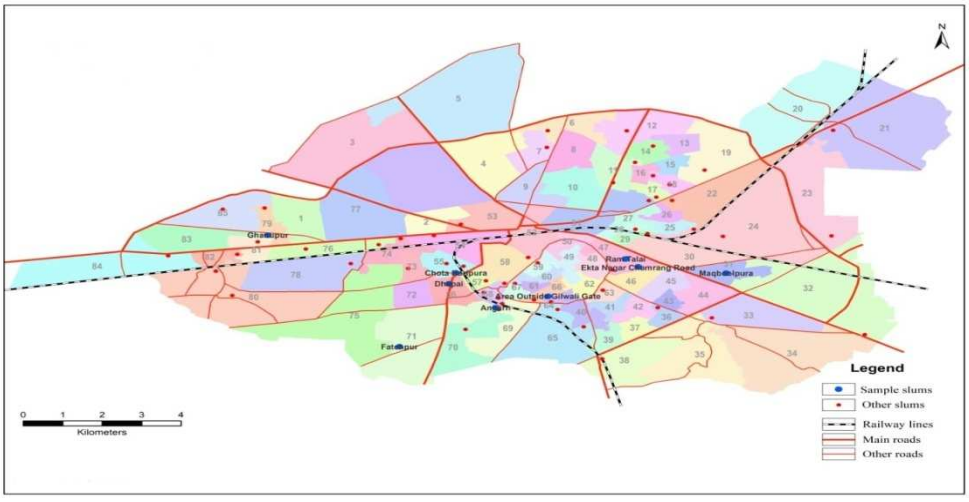
To evaluate the quality of life, z-score has been calculated for all the indicators using the following formula:

$$z = (x-\mu)/\sigma$$

Where z is the z-score, X is the original value of the ith variable, μ is the mean value of the ith variable and σ is the standard deviation from the mean value.

Composite score has been computed after calculating the z-score by summing up z-score values of all indicators for all six categories of slums to know the levels of quality of life in slums of Amritsar city.

Figure-1
Location of slums in Amritsar city (Ward wise)



Source: Prepared by Researcher

Results and Discussion

The present study is divided into two sections. In the first section, availability of basic amenities in slums of Amritsar city has been discussed (See Table 3). Basically, five parameters are chosen to assess the availability of basic amenities in different slums of Amritsar city. Five parameters that are used to determine basic amenities are source of drinking water, type of toilet facility, availability of drainage connectivity, access to electricity supply and type of fuel used for cooking. In the second section, on the basis of these parameters, the quality of life in different slums has been evaluated using composite score.

i. Assessment of Basic Amenities in Amritsar Slums

Safe drinking water is a fundamental human need. If there was no water, there would have been no life on earth. In the slums of Amritsar city, there are four major sources of drinking water i.e. piped water supply by Municipal Corporation, hand pumps, private arrangement of piped water and tanks (See Table 3). Piped water is the most common source of water used by 55.86 percent of the slum population in all slums. The second most preferred water source by slum population is hand pump which is used by 22.96 percent people. Nearly 10 percent of slum population opted for both the private arrangement and tanks as their source of drinking water. In sporadic slums, 65.78 percent people are using piped water for drinking whereas in refugee slums, only 30 percent people drink water from the piped sources. More than a quarter (27.27%) of population in Industrial slums and the slums along walled city consume water by hand pump as their major source of drinking water. Private piped water sources are chosen as the source of drinking water by 14.75 percent population in the slums along railway lines. Tanks were used as a source of drinking water by 15.31 percent population in the slums along major roads whereas only 7.01 percent population used tanks to drink water in slums which are spread sporadically.

Toilet facilities are of utmost importance for each household. The most commonly used toilet facilities available in the slums are flush and pits (See Table 3). Majority (78.17%) of slum dwellers in Amritsar use flush system whereas 15.63 percent slum population has pit toilets in their own houses. On the other hand, there are 6.18 percent slum dwellers that go to open grounds or farms near the slum areas for toilet purposes. Majority (86.48%) of people in slums along major roads have flush system for toilet purposes in their houses. While 26.36 percent people in industrial slums use pits for toilet purposes. About 9 percent people in sporadic slums also have pits in their houses. Nearly one tenth population in industrial slums goes to open grounds and nearby farms for toilet purposes.

Waste disposal is a very common problem in slum areas as these areas are considered backward and therefore no attention is paid to them. The disposal of both the solid and the liquid waste must be proper in order to ensure proper

hygiene in the area. The water disposal facility in slums is either open, closed or there is no specific system of drainage (See Table 3). More than half (51.62%) of slum dwellers have drainage facility but their facility is not covered which poses a great risk to their health as many water borne diseases can easily spread through flies and mosquitoes. While 10.09 percent slum population has closed facility for water disposal whereas 38.27 percent people in the slums have no facility available for water disposal. 64.03 percent people in sporadic slums have an open water disposal facility. However, 21.21 percent of slum people in slums along old walled city have closed facility for water disposal. 4.91 percent people in slums along railways also have closed facility to dispose of their liquid waste. Fifty percent dwellers in industrial slums have no special facility for the disposal of liquid waste so industrial effluents can cause serious skin disorders and other ailments.

Electricity is one of the most important blessings that science has given to mankind. It has become a vital part of modern life and one cannot think of a world without it. Slum dwellers in Amritsar have both legal as well as illegal supply of electricity (See Table 3). Nearly four-fifth percent of people have legal access to electricity in the slums of Amritsar. A small proportion of slum population i.e. 11.88 percent has no access to electricity. An insignificant minority of 3.42 percent population have access to electricity from illegal sources. Most (96.96%) of the population in slums along old walled city has legal access to electricity supply. Sixteen percent of slum population in slums along major roads has no assured access to electricity. About a small proportion of slum people i.e. 10 percent in refugee slums have an access to electricity from illegal sources. About 2 percent people in Industrial slums use electricity from illegal sources. There are chances that people are more prone to accidents by electric shocks during power theft.

A very important ingredient to slum upgrading is improving basic household services like the energy used for cooking and the open living spaces. LPG, Kerosene, Electricity, Firewood or Dung cakes are the four different sources used by the slum population in Amritsar to cook food (See Table 3). About 7.50 percent of slum population uses LPG as fuel for cooking food in the various slums of Amritsar whereas 2.60 percent people use kerosene to cook their food. Around 10 percent of slum population uses electricity to prepare their food in their own houses. More than one third population has firewood or dung cakes as fuel to cook food. Around 58 percent of population in the slums along the old walled city use LPG as fuel to cook food and 35.24 percent population in slums along railway also uses LPG to prepare food. Around 12 percent population in slums along old walled city use kerosene to cook food. Less than one third of the population in the refugee slums use electricity as fuel to cook food. About 42 percent of slum population in the industrial slums of Amritsar cooks food with

the help of firewood or dung cakes. About 5 percent population in the slums along railways also uses firewood or dung cakes to cook food. People using dung cakes and kerosene are prone to many health related diseases which increases chances of respiratory problems.

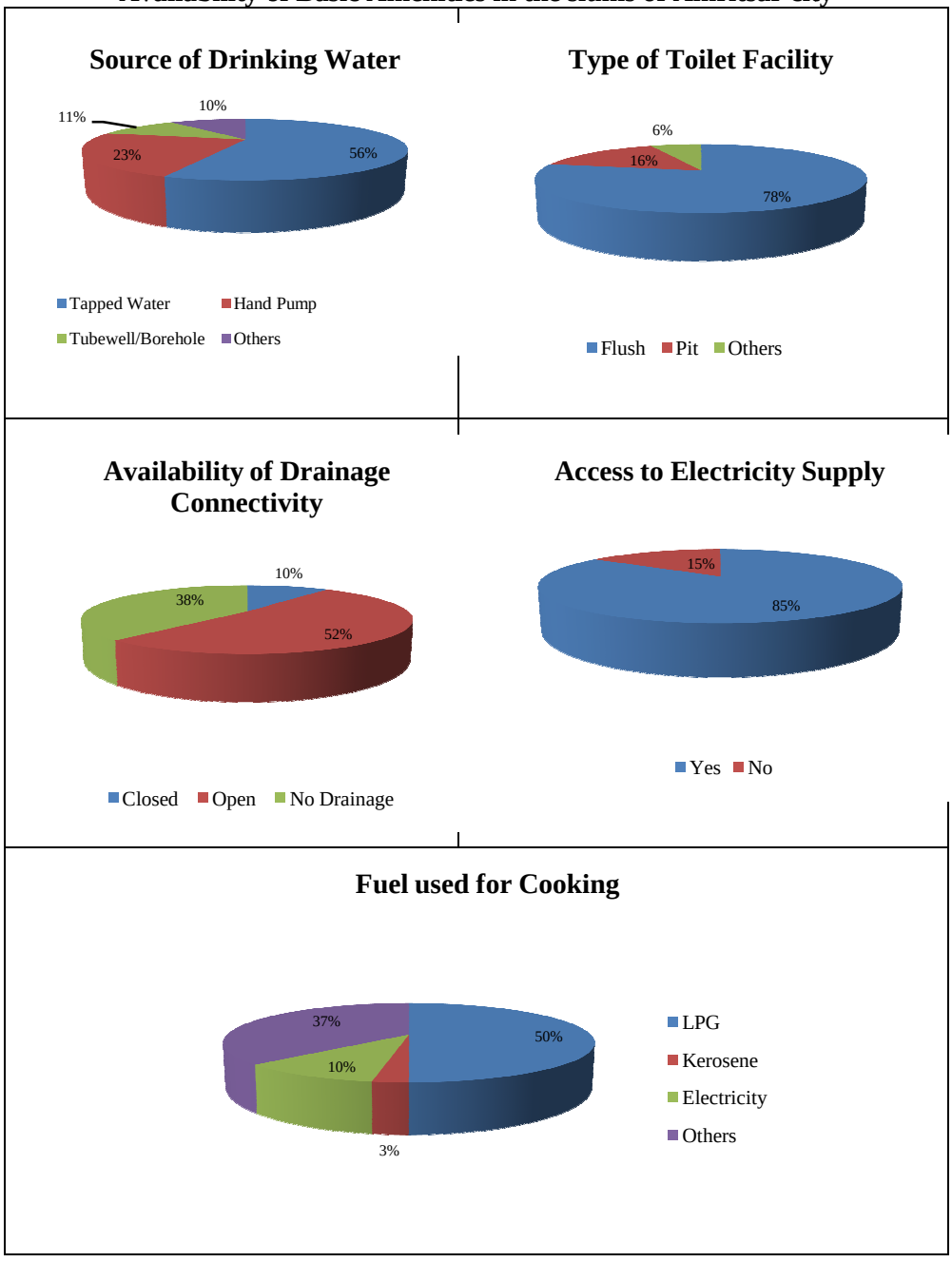
Table-3
Availability of Basic Amenities in slums of Amritsar city

Parameters	Indicators	Slums along railway	Slums along major roads	Old Walled city slums	Industrial slums	Refugee slums	Sporadic slums	Total
		% of HH[(1)]	% of HH	% of HH	% of HH	% of HH	% of HH	
Source of drinking water	Tapped Water	47.54 (58)	53.15 (59)	39.39 (13)	54.54 (60)	30 (3)	65.78 (150)	55.86 (343)
	Hand Pump	25.40 (31)	18.01 (20)	27.27 (9)	27.27 (30)	30 (3)	21.05 (48)	22.96 (141)
	Tubewell/ Borehole	14.75 (18)	13.51 (15)	21.21 (7)	9.09 (10)	20 (2)	6.14 (14)	10.74 (66)
	Others[(2)]	12.29 (15)	15.31 (17)	12.12 (4)	9.09 (10)	20 (2)	7.01 (16)	10.42 (64)
Type of toilet facility	Flush	71.31 (87)	86.48 (96)	75.75 (25)	65.45 (72)	60 (6)	85.08 (194)	78.17 (480)
	Pit	21.31 (26)	9.00 (10)	21.21 (7)	26.36 (29)	40 (4)	8.77 (20)	15.63 (96)
	Other	7.37 (9)	4.50 (5)	3.03 (1)	8.18 (9)	0 (0)	6.14 (14)	6.18 (38)
Availability of drainage connectivity	Closed	4.91 (6)	14.41 (16)	21.21 (7)	9.09 (10)	30 (3)	8.77 (20)	10.09 (62)
	Open	51.63 (63)	40.54 (45)	45.45 (15)	40.90 (45)	30 (3)	64.03 (146)	51.62 (317)
	No drainage	43.44 (55)	45.04 (50)	33.33 (11)	50 (55)	40 (4)	27.19 (62)	38.27 (235)
Access to electricity supply	Yes (Legal/ Illegal)	81.14 (99)	81.08 (90)	96.96 (32)	87.27 (96)	90 (9)	85.08 (194)	84.69 (520)
	No	18.85 (23)	18.91 (21)	3.03 (1)	12.72 (14)	10 (1)	14.91 (34)	15.30 (94)
Fuel used for cooking	LPG	35.24 (43)	48.64 (54)	57.57 (19)	53.63 (59)	40 (4)	56.14 (128)	50 (307)
	Kerosene	0.81 (1)	1.80 (2)	12.12 (4)	1.81 (2)	0 (0)	3.07 (7)	2.60 (16)
	Electricity	15.57 (19)	10.81 (12)	6.06 (2)	2.72 (3)	30 (3)	10.96 (25)	10.42 (64)
	Other[(3)]	4.83 (59)	38.73 (43)	24.24 (8)	41.81 (46)	30 (3)	29.82 (68)	36.97 (227)

Source: Primary Survey
Notes: [(1)]HH stands for Household.
[(2)] Others include wells and tanks.
[(3)] Firewood/Coal/Crop residue/Dung cakes etc.

All figures in the table are in percentile and the figures in the brackets are actual number of people surveyed.

Figure-2
Availability of Basic Amenities in the slums of Amritsar city



Source: Calculated using Primary Data

Table-4
Selected variables for quality of life of slum dwellers of Amritsar city and their X value

Variables	Parameters	Indicators	Weightage value	Slums along railway		Slums along major roads		Walled city slums		Industrial slums		Refugee slums		Sporadic slums	
				% of HH	X value	% of HH	X value	% of HH	X value	% of HH	X value	% of HH	X value	% of HH	X value
X1	**Source of drinking water**	Tapped Water	4	48	1.92	53	2.12	39	1.56	55	2.2	30	1.2	66	2.64
		Hand Pump	3	25	0.75	18	0.54	27	0.81	27	0.81	30	0.9	21	0.63
		Tubewell/Borehole	2	15	0.3	14	0.28	21	0.42	9	0.18	20	0.4	6	0.12
		Others[(1)]	1	12	0.12	15	0.15	12	0.12	9	0.09	20	0.2	7	0.07
X2	**Type of toilet facility**	Flush	3	71	2.13	87	2.61	76	2.28	66	1.98	60	108	85	2.55
		Pit	2	22	0.44	9	0.18	21	0.42	26	0.52	40	0.8	9	0.18
		Other	1	7	0.07	5	0.05	3	0.03	8	0.08	0	0	6	0.06
X3	**Availability of drainage connectivity**	Closed	3	52	1.56	41	1.23	46	1.38	41	1.23	30	0.9	64	1.92
		Open	2	5	0.1	14	0.28	21	0.42	9	0.18	30	0.6	9	0.18
		No drainage	1	43	0.43	45	0.45	33	0.33	50	0.5	40	0.4	27	0.27
X4	**Access to electricity supply**	Legal	3	81	2.43	81	2.43	97	2.91	87	2.061	90	2.7	85	2.55
		Illegal	2	5	0.1	3	0.06	3	0.06	2	0.04	10	0.2	4	0.08
		No supply	1	14	0.14	16	0.16	0	0	11	0.11	0	0	11	0.11
X5	**Fuel used for cooking**	LPG	4	35	1.4	49	1.96	58	2.32	54	2.16	40	1.6	56	2.24
		Electricity	3	16	0.48	11	0.33	6	0.18	3	0.09	30	0.9	11	0.33
		Kerosene	2	1	0.02	2	0.04	12	0.24	2	0.04	0	0	3	0.06
		Others[(2)]	1	5	0.05	39	0.39	24	0.24	42	0.42	30	0.3	30	0.3

Source: Calculated using Primary Data
Notes: [(1)] Others include wells and tanks.
[(2)] Firewood/Coal/Crop residue/Dung cakes etc.
HH stands for Household. Weightage has been assigned according to the rank. X value is calculated by dividing the weightage value by 100 and then multiplying it by the percent of household.

ii. Levels of Quality of life

In this section, five essential parameters have been taken to evaluate the quality of life in major slums of Amritsar city. To determine the level of quality of life, composite z-score has been computed by summing up z-score values of all the five indicators of quality of life (See Table 4). The Mean value for calculated composite score is 13.308.

Table-5
Composite Score for Slums in Amritsar City

Slum Category	X1	X2	X3	X4	X5	X	X-X	(X-X)2
Slums Along Railway	3.09	2.64	2.09	2.67	1.95	12.44	-0.868	0.753
Slums along major roads	3.09	2.84	1.96	2.65	2.72	13.26	-0.048	0.002
Walled city slums	2.91	2.73	2.13	2.97	2.98	13.72	0.412	0.169
Industrial slums	3.28	2.58	1.91	2.76	2.71	13.24	-0.068	0.004
Refugee slums	2.7	2.6	1.9	2.9	2.8	12.9	-0.408	0.166
Sporadic slums	3.46	2.79	2.37	2.74	2.93	14.29	0.982	0.964
Total						79.85		2.058

Source: Calculated using Primary Data

Based on the calculation of composite z-score values, levels of quality of life have been grouped into three categories i.e. low (composite z-score of between 11.5-12.5), medium (composite z-score of between 12.5-13.5) and high (composite z-score of between 13.5-14.5) (See Table 6). Slums along railway lines i.e. Chhota Haripura and Angarh have low level of quality of life. Slums along major roads which are either on highways or on roads connecting other district headquarters have medium level of quality of life. In this study, two slums on major roads were taken for primary survey namely, Dhapai and Ekta nagar. Industrial and Refugee slums have also medium level of quality of life. It is interesting to note here that slums which are spread sporadically and slums along old walled city in the center of the city have high quality of life. All the basic amenities are easily available in those areas which are scattered sporadically and are in central parts of Amritsar city.

Table-6
Levels of Quality of life

Level of quality of life	Composite score	Slum category
Low	11.5-12.5	Slums along railway
Medium	12.5-13.5	Refugee slums, Industrial slums, Slums along major roads
High	13.5-14.5	Walled city slums, Sporadic slums

Source: Calculated using Primary Data

Conclusions

In this study, it is clear that the access to basic amenities varies among different slums in the Amritsar city on the basis of their location in the city. In most of the slums, people are still dependent upon ground water for drinking purposes. Municipal water supply is still a distant dream for many slums. Almost 45 percent slum population is still not having access to piped water by the Municipal Corporation. About 22 percent people still don't have access to toilet facility of their own. Lack of proper waste disposal facility and poor sewage system are causing pollution and health related problems in slums. In slums around 39 percent areas have no proper drainage system although this is the most important aspect to maintain proper hygiene. More than half of the slum population has to face open drainage which is leading to serious health ailments. It is difficult to digest that in 21st century, people still have no access to electricity like in Amritsar slums. It is interesting to note that almost 50 percent people have to use conventional sources of energy to cook their food. Level of disparity among different slums is also leading to change in socio-economic setup of the city. Though quality of life is low in all sample slums but it varies from one slum to another. In order to improve the socio-economic condition of slum dwellers, government must make efforts to improve quality of life in slums through services like tenure regularization. Slum upgrading should be adopted as a solution with presence of basic amenities as required especially after discussion and agreement with slum residents. Affordable housing is also the need of the hour along with the presence of basic facilities. The successful implementation of the new mission of the Government of India i.e. Prime Minister Awas Yojana (PMAY) will lead to improved quality of life and access of improved amenities to slum dwellers. A number of non-government organizations have been working to normalize the life of slums dwellers in Amritsar. Government should encourage private sector for its involvement in improving the condition of slums. There is an urgent need to minimize the variations in the availability of basic amenities by strengthening the financial resources and technical capacity for adequate provision of basic amenities.

Acknowledgement

We thank the officials of Municipal Corporation of Amritsar which provided relevant data required for the research, Department of Geography, Panjab University, for logistical coordination and support. We show our sincere gratitude towards all the interviewees who generously donated their time and shared their stories. We also thank the journal editors for their helpful comments and suggestions to make this research paper more relevant.

References

Burgess, R. (1982). Self-Help Housing Advocacy: A Curious Form of Radicalism. A Critique of the Work of John F.C. Turner.In Ward, P. (Ed.) *Self-help Housing: A Critique,* Mansell Publishing Limited, London.

Chowdhury, F. J. (2006). Environmental assessment in slum improvement programs: Some evidence from a study on infrastructure projects in two Dhaka slums, *Environmental Impact Assessment Review,* 26(6): pages 530-552.

Das, B. (1999). Slum Dwellers in Indian Cities: A Case Study of Surat, *Man and Development,* 21(3): 92-142.

De, S., & Singh, A. M. (1980). *The urban poor, slums and pavement dwellers in major cities of India*, New Delhi, Manohar Publishers, Delhi, 26-27.

Fox, S. (2008). On the origin and consequences of slums, Development studies institute, LSE, Feb 2008.

Giok, O., & Phua, K. H. (2007). Urbanization and slum formation, *Journal of Urban Health: Bulletin of the New York Academy of Medicine,* 84(1).

Habib, E. (2009). The role of government and NGOs in slum development: The case of Dhaka city, *Development in Practice,* 19(2): 259-265.

Mitra, A. (1994). *Urbanization, slums, Informal sector employment and poverty,* B.R. Publishing Corporation: New Delhi.

National Sample Survey Organization. (2003).*Conditions of Urban slums*-2002.

Census of India. (2001). *Primary Census Abstract for Slum*, Office of the Registrar General and Census Commissioner, India, New Delhi.

Census of India. (2011). *Primary Census Abstract for Slum*, Office of the Registrar General and Census Commissioner, India, New Delhi.

Kuffer, M., Pfeffer, K., & Sliuzas, R. (2016). Slums from space—15 Years of slum mapping using remote sensing., 455. https://doi.org/10.3390/rs8060455 www.mdpi.com/journal/remote sensing 2016.

Owusu, G., & Lund, R. (2005). Slums of hope and slums of despair: Mobility and livelihoods in Nima, Accra, *Norwegian Journal of Geography*, 62: 180-190.

Punjab urban planning & development authority. (2010). Draft master plan Amritsar (2010-2031).

Saini, L. D. (1994). Slums in an industrial city (A case study of Ludhiana), Ph.D thesis, Panjab University, Chandigarh.

Sandhu, R. S. (1989). *The city and its slums: a sociological study*, Guru Nanak dev university Publishers, Amritsar.

Sandhu, R. S. &Sekhon, B.S. (2017). “Slums and Planning in Urban India : A case study of Amritsar City”, in N. Jayaram (editor), Social Dynamics of the Urban Studies from India, Springer publications, 175-192.

Town and Country Planning Department. (2011a). Master Plan for Amritsar, Chandigarh: Government of India

Tripathi, S. (2015). Determinants of Large City Slum Incidence in India: A Cross-Sectional Study, *Poverty and public policy*, 7(1).

UNFPA (United Nations Population Fund). (2007). Annual Report (2007), UNFPA, New York, NY, 30 pages, accessed 14 March 2019.

UN-Habitat (2003).The Challenges of Slums, United Nations Human Settlements Programme, Sterling, VA.

UN-Habitat (2003a). The Challenges of Slums, Global Report on Human Settlements, *Earthscan Publications Ltd*. London.

UN-Habitat (2007). Report on “State of the World Cities 2006/2007”, UN-Habitat, Nairobi, Kenya.

UN-Habitat (2010). Report on “Cities for all: Bridging the urban divide: 2010-11”, UN-Habitat, Nairobi, Kenya.

United Nations (2000).United Nations Millennium Declaration, General Assembly, Resolution No. 2, Session 55.

WUP (2014).World urbanization prospects. 978-92-1-151517-6 Published by the United Nations.

Man & Development
Vol. XLIII No. 4, December 2021,
http://www.crrid.res.in/journal/
ISSN 0258-0438

BLEEDING GROUND WATER RESOURCES OF PUNJAB, INDIA: ASSESSING THE MAGNITUDE

Kriti Jain[1]and Sucha Singh Gill [2]

Abstract: As Punjab's agriculture becomes uneconomical and unsustainable against unbridled exploitation of its natural resources, it becomes important to understand the extent and impact of such a use pattern. With more than 71 per cent of its net irrigated area under tubewells, ground water has become that precious yet scarce resource, critical to the state's agricultural output. In this paper, we take stock of what is happening to this valuable resource and what rate, through an analysis of the secondary data. As of 2017, Punjab runs a shortage of 14.4 billion cubic metre (bcm) of ground water for future irrigation needs of the state. With 79 per cent of its blocks being over-exploited, water table in the state has been depleting at the rate of 0.25 metre/year since 1975, a significant decline, from 7.6 metres below ground level (mbgl) in 1975 to 17.4 mbgl in 2017. Significant factors determining ground water draft for irrigation were rainfall (inversely), area under paddy (directly) and net irrigated area by tubewells (directly). Farmers perceived paddy cultivation as the pivotal reason for depleting ground water in the state, and recommend political commitment and action to provide viable incentives to encourage other high value crop production.

Keywords Ground water• Depletion • Over-exploitation • Sustainability • Paddy • Farmer Perception

Introduction

The finiteness of water and energy as resources to be exploited for overall development around the world, has made its scarcity and inefficient use an increasing cause of concern in both developed and developing countries. The ability to mobilise water resources is critical for irrigation in agriculture in most

[1]Ph.D. candidate with Centre for Research in Rural and Industrial Development, Chandigarh
Email: kriti0892@gmail.com
[2]Senior Professor, Centre for Research in Rural and Industrial Development, Chandigarh
Email:gsuchasingh@gmail.com

parts of the world. In South Asia, 90 per cent of the total water is consumed in agriculture. Though irrigation accounts only for 39 per cent of the crop land, it accounts for 60-80 per cent of the food production (World Bank) and scarcity of water, therefore, threatens food security. Asia produces the largest share of food production from depleting groundwater, especially in North West India and North China plain (Shah, Burke, & Villholth, 2007). Population growth, rapid urbanization and water intensive agriculture, have put astronomical pressures on the fragile ground water resources of India.

The Green Revolution package in Punjab has been extremely successful in augmenting crop production and achieving food security for the country as a whole. Assured and timely irrigation has been a key input in achieving the phenomenal success that Punjab witnessed. North West India's almost exclusive dependence on ground water for irrigation is not in sync with the resource availability. In Punjab in 2015-16, ninety nine percent of gross area sown was irrigated, complete net area sown was irrigated and the intensity of irrigation was 188, with ground water as the main irrigation source. Around 3 million hectares of land was irrigated by more than 1.4 mn tube wells in the state (Economic Survey of Punjab, 2016-17, p. 139). Thus, less availability of annual ground water as compared to the consumption is resulting into severe water imbalance in the state (Central ground water board, Northwestern region 2013).

A major reason for low surface water irrigation was the reorganisation of Punjab in 1966, that led to surface water resources shrinking to 25 per cent. Increase in irrigated area after 1990-91 was mainly under tubewells due to requirements of increasingly dominant paddy crop in the state, which is highly responsive to water. Provision of free electricity for the agriculture sector further encouraged the use of electrified tubewells(Ghuman, 2017). Rapid ground water depletion has potentially disastrous consequences for the current agricultural system, that is global in nature. The Punjab model of irrigation is marked by unbridled demand for irrigation water along with unconstrained extraction of ground water for meeting the food requirements of the country. As per estimates, annual ground water extraction in Punjab is 31.6 billion m^3 as against 21.44 billion m^3 availability, the excess being met by over extraction of ground water (Pandey 2014). Between 1973-2005, water levels in central Punjab fell at the rate of 23 cms per year and in north eastern Punjab at the rate of 7.5 cms per year. In South Western Punjab, however, water table rose at rate of 14 cms per year. Further, the rate of fall kept increasing in Punjab from 7 cms per year to 22 cms per year to 53 cms per year (Singh, 2011).

As water tables have fallen below sustainable levels, inequity in access to irrigation has raised its face and has perpetuated the already existing land and income inequalities. The increasing water demands manifest themselves not only

in localised implications but also have led to inter-state water disputes, like between Punjab and Haryana. Beginning 1980s and early 1990s, stagnating yields, rising cost of cultivation and declining profit levels emerged as major concerns indicative of an emerging crisis in Punjab's agriculture (Sidhu, 2002). The rainfall in Punjab declined in last two decades, putting an additional load on groundwater. It forced farmers to sink deeper tube wells to irrigate their paddy fields.

The production system that evolved in Punjab with the coming of Green Revolution, did not pay heed to the long-term sustainability of the state's scarce resources (land and water), focusing on the short-term goal of increasing crop production and productivity in the initial stages.

Therefore, the aim of this paper has been to measure the extent of ground water depletion in Punjab and reiterate the need to manage this resource as an open-access, non-renewable natural resource.

Methodology

Temporal analysis of several parameters related to ground water in Punjab, was done using secondary data based on various government reports. Further breakdown of the period for analysing trends is done on a five yearly and/or decadal basis. Compound annual growth rates are reported in a decadal format, wherever calculated. To determine the significant factors that affect the draft of ground water for irrigation, an Ordinary Least Squares regression was run for Punjab's district level data for the years 2004, 2009, 2011, 2013 and 2017. A total of 75 observations were run for the analysis. As regards the district level analysis, there are 22 districts in the state at present. But, for purposes of analysing the trends, the original 11 districts were taken into consideration. The data with respect to different variables of the other 11 districts, which were formed out of original 11, were merged back into them in proportion of their extracted geographical area (ICRISAT). This was done to make the data comparable and more meaningful.

Further, a farmer survey of 320 respondents (using a structured interview schedule) was undertaken across four varied districts of Punjab, namely, Barnala, Bathinda, Hoshiarpur and Tarn Taran, based on their geographical and cultural distinctions and other variables related to ground water usage. The survey, attempted to gauge the farmer perception on important issues revolving ground water availability and extraction.

CAGR has been calculated to show both extent of growth rate and change in growth rate trends for our above-mentioned period of analysis, both for Punjab level and District level data.

Exponential growth Function: $Y_t = \alpha\beta^t$ ……. (1)

Where Y_t = Area under different irrigation system/Area of crops for the year t

α = constant

$\beta = (1+r)$

T = Time variable (1, 2, ……, n) for each period

Log transformation: $\ln Y^t = \ln \alpha + t(\ln\beta)$ …….... (2)

where,

$\ln\beta = \ln(1+r)$

$r = [\text{antilog}(\ln \beta) - 1] \times 100$

where, r is the compound annual growth rate

OLS regression was estimated using,

$Y = a_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + \epsilon$

where,

Y = Net draft of ground water for irrigation (ham)

a_0 = Intercept

b_1, b_2, b_3 and b_4 are coefficients corresponding to inputs X_1, X_2, X_3 and X_4 respectively

X_1 = Recharge from sources other than rainfall (ham)

X_2 = Rainfall (mm)

X_3 = Rice acreage (000 ha)

X_4 = Net Irrigated Area by tubewell (000 ha)

ϵ = Random Error

Results and Discussion

Tubewells (both diesel and electric) have become indispensable to Punjab's irrigated agriculture, as demand for it surged in the wake of new technological revolution and because of pitfalls of the already existing public irrigation network of surface irrigation in the state. The fast pace of increase can be attributed to the conducive infrastructure and incentive environment in the state, in the form of subsidized and easy institutional rural credit, rural infrastructure, rural electrification, cheap energy to agriculture, high Minimum Support Price (MSP) and assured procurement for water intensive crops. Between 1970-71 and 2017-18, share of net irrigated area (NIA) by tubewells in Punjab grew from 55 to 71 per cent, with absolute area under tubewells growing at the rate of 1.3 per cent compounded annually during the period. Total tubewell stock in Punjab grew at the rate of 3.5 per cent per annum for forty-five years, from just close to 0.2 mn in 1970-71 to a whopping 1.5 mn in 2017-18. The phenomenal growth in

tubewells took place as the productivity benefits of increased control over water, and high yields of water intensive paddy and wheat crops, became more visible in the state. A sort of bandwagon effect was taking place, a prominent phenomenon among farmers (between 1965-80, yield of wheat and paddy grew at the compound annual rate of 5 per cent and 7 per cent, respectively, growing at 2 per cent and 0.8 per cent between 1980-95) (Statistical Abstract of Punjab).

Punjab's Ground water Resources: Availability, Exploitation and Future

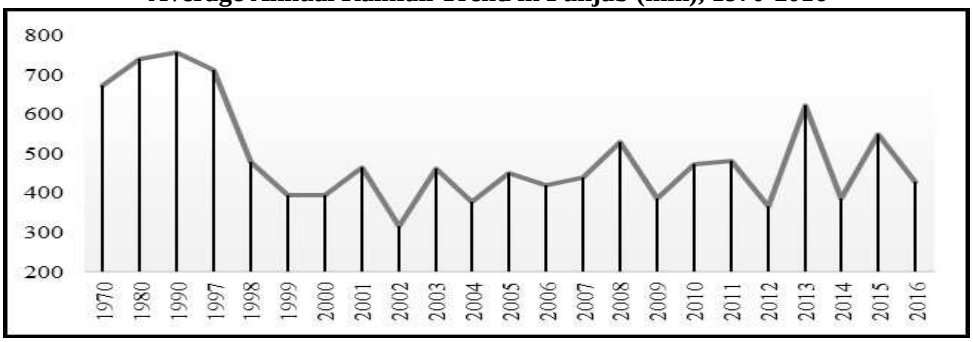
Depletion of ground water in sweet water region of Punjab, has been the most devastating consequence of the state's changed irrigation structure. In a span of merely five years, between 2013-17, stage of ground water development, defined as the ratio of annual ground water draft to net annual ground water availability (in %), with respect to irrigation water usage, increased by fourteen percentage points from 146 per cent to 160 per cent. This fast pace of change took place at the rate of 2 per cent per annum, which is considerable given a high base value for change. Net annual ground water availability for future irrigation use fell by 20 per cent between the same period. Net annual ground water availability for future irrigation has been on a decline since 1984, except for an improvement in 1992 and 2013. The balance turned negative at the beginning of the 21st century (-9.8 billion cubic metre in 2004) and has since seen an increase in the deficit by 47 per cent as of 2017. Further, total net annual ground water availability has reduced by 8 per cent as draft of ground water increased, on account of an increase in draft in both irrigation and industrial and domestic usage (59 per cent increase in demand for industrial and domestic usage between 2013-2017), indicating the fast-growing need for ground water in uses other than agriculture (Central Ground Water Board 2013 & 2017).

Table-1
Average Annual Rainfall Trend in Punjab (mm), 1970-2016

Year	Average Annual rainfall in PB (mm)	Year	Average Annual rainfall in PB (mm)
1970	672	2006	418
1980	739	2007	438
1990	754	2008	529
1997	710	2009	385
1998	477	2010	472
1999	392	2011	480
2000	392	2012	366
2001	463	2013	620
2002	315	2014	385
2003	460	2015	547
2004	375	2016	427
2005	448		

Source: Ground Water Resources of Punjab State 2017

Fig.-1
Average Annual Rainfall Trend in Punjab (mm), 1970-2016



Source: Ground Water Resources of Punjab State 2017

Table-2
State-Wise Ground Water Extracted for Irrigation as a Percentage of Total Ground Water Extracted for All Uses, 2017

State	Percentage of Ground Water Extracted, 2017
Punjab	97
Gujarat	95
Maharashtra	92
Madhya Pradesh	92
Haryana	92
West Bengal	92
Karnataka	91
Uttar Pradesh	89
Tamil Nadu	89
Rajasthan	89
India	**89**

Source: Ground Water Resources of Punjab State 2017

Punjab's aquifer is under potential threat of depletion by the year 2025 because of the unsustainable use of ground water in the state, with demand increasingly outweighing the supply (Worldwatch Institute 1998). Punjab has been witnessing a falling trend in its annual rainfall (mm) from 672 mm to 427 mm during 1970-2017 (See Table-1andFig.-1**Error! Reference source not found.**), where, in 2017 it contributed to only 29 per cent of ground water recharge, compared with 31 per cent in 2004 (Central Ground Water Board, North Western Region, 2017). This points towards an immense opportunity towards harvesting of rainwater for conservation in the state. Inter-state comparison suggests that, Punjab extracted the highest proportion of its annual ground water draft for irrigation purposes. Ground water extraction by the state was close to eight percentage points higher than the national average and five percentage points higher than her neighbouring state of Haryana (See Table-2). Highest stage of ground water development was observed in Punjab, followed by Rajasthan and Haryana. Stage of ground water development in Punjab was more

than 2.5 times the national average and 1.2 times that of Haryana (See Table-3). Since all the states with high ground water stage of development also use the maximum of their ground water resources for irrigation, these states have a ground water backed agrarian economy. Shortage for future ground water availability in Punjab increased to 14.3 bcm in 2017 from 11.6 bcm in 2013, implying excessive ground water usage (See Table-4andFig**.-2**). The deficit in ground water availability for future irrigation in Punjab is close to five times that in Haryana and close to three times that in Rajasthan. The above information clearly points towards an impending ground water crisis in the grain basket belt of the country, thus threatening the food security of the nation.

Table-3

State-Wise Existing Gross Ground Water Extraction for All Uses as a % age of Annual Extractable Ground Water Resources (Stage of Ground Water Development), 2017

State	Stage of Ground water Development: 2017
Punjab	166
Rajasthan	140
Haryana	137
Delhi	120
Himachal Pradesh	86
Tamil Nadu	81
Uttar Pradesh	70
Karnataka	70
Telangana	65
Gujarat	64
India	**63**

Table-4

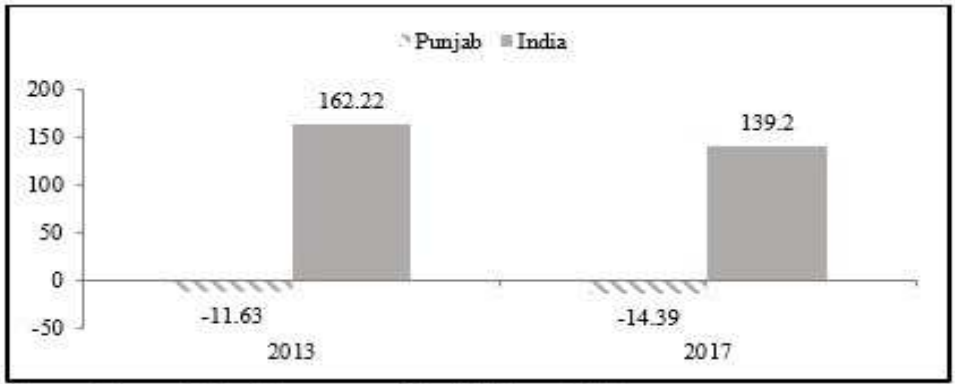
Future Availability of Ground Water for Irrigation (bcm), 2013 vs. 2017

Punjab	-11.63	-14.39
India	162.22	139.2

Source: Ground Water Resources of Punjab State 2017

Fig.-2

Future Availability of Ground Water for Irrigation (bcm), 2013 vs. 2017



Source: Ground Water Resources of Punjab State 2017

Extent of Ground water Utilization and Overexploitation

Structures for extracting ground water have been increasing at a rapid pace. Number of tubewells per thousand hectares of irrigated area have been increasing at a compound growth rate of 3 per cent per annum, since 1970. Tubewell density has increased from 66.5 in 1970-71 to 357.9 in 2017-18, a more than five-fold increase (See Table-5). Maximum growth was observed during the decade 1970-80, when number of tubewells per thousand hectares of irrigated area grew at the rate of 10 per cent per annum, growing almost by three times, of which maximum increase was seen in the five-year period of 1970-75 as green revolution was picking up faster, paddy was becoming the demanded crop and tubewell irrigation was being given impetus. As a corollary, area (ha) covered per tubewell has been falling. It fell from 15 hectares in 1970-71 to 2.8 hectares in 2017-18 (See Table-5), suggesting falling productivity of tubewells, plausibly because of wells failing or unsustainable further deepening of tubewells, as water table deepens.

Table-5
Tubewell Density and Productivity in Punjab, 1970- 2017

Period	No. of tubewells per thousand hectares ofirrigated area	Area covered per tubewell(hectares)	Period	No. of tubewells per thousand hectares ofirrigated area	Area covered per tubewell (hectares)
1970-71	66.5	15.0	2000-01	265.7	3.8
1975-76	144.3	6.9	2005-06	293.8	4.3
1980-81	177.4	5.6	2010-11	339.6	2.9
1985-86	179.4	5.6	2015-16	343.0	2.9
1990-91	204.7	4.9	2016-17	343.8	2.9
1995-96	227.2	4.4	2017-18	357.9	2.8

Source: Author's own calculations

An interstate comparison suggests that, Punjab has the highest percentage of its blocks in the over-exploited ground water category (79%). This is fourteen percentage points higher than Delhi, with second highest number of overexploited blocks and eighteen percentage points higher than Haryana. The percentage of overexploited blocks in Punjab is 4.5 times more than in the country as a whole. Punjab has among the least percentage of safe category blocks, after Delhi and Rajasthan, and four percentage points lower than in neighbouring Haryana. At the national level, maximum percentage of blocks fall in ground water safe category, whereas in case of Punjab, maximum blocks fall in the over- exploited category (See Table-6). Number of ground water over-exploited blocks were rising consistently from 1984 to 2009 (See Table-7), with the sharpest rise in such blocks during 1999-2004, also the period when the trend of demand for ground water exceeding supply began. During this period, the percentage of white, grey and critical blocks also saw the sharpest fall in their numbers. The number of over-exploited blocks in Punjab grew at the rate of 7.1 per cent per annum during

1999-2004, while semi-critical and critical and safe blocks fell at the rate of 19.7 per cent per annum and 8 per cent per annum (See Table-8 and Fig.-3), respectively, as the number of blocks moved from these categories into the more exploited categories. There has been consistent rise in the percentage of overexploited blocks, from 45 per cent in 1984 to 79 per cent in 2017, indicating the severe extent of ground water overdraft.

Table-6

Percentage of Over-Exploited and Safe Blocks in States with 50% or more Over-Exploited Blocks, 2017

State	Per cent Over Exploited Blocks	Per cent Safe Blocks
Punjab	79	16
Delhi	65	9
Rajasthan	63	15
Haryana	61	20
Himachal Pradesh	50	38
India	17	63

Source: Author's Own Calculations

Table-7

Trend in Number of Blocks in Different Categories in Punjab

Different Categories	1984	1986	1989	1992	1999	2004	2009	2011	2013	2017
Dark / Overexploited	53	55	62	63	73	103	110	110	105	109
Dark /Critical	7	9	7	7	11	5	3	4	4	2
Grey / Semi-critical	22	18	20	15	16	4	2	2	3	5
White/ Safe	36	36	29	33	38	25	23	22	26	22
Total no. of blocks	**118**	**118**	**118**	**118**	**138**	**137**	**138**	**138**	**138**	**138**

Source: Author's own calculations

Table-8

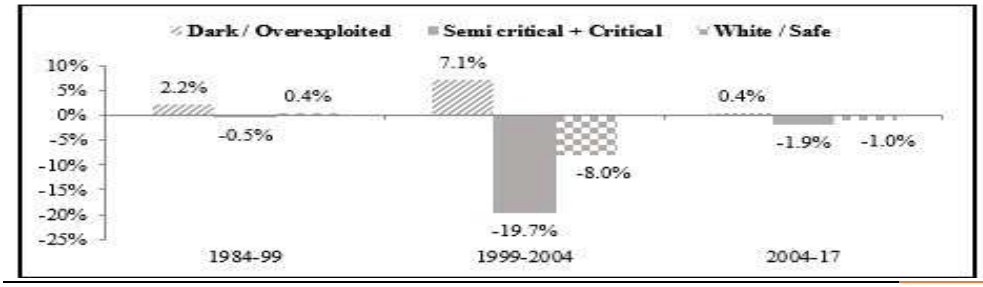
Trend in Compound Annual Growth (%) of Blocks under Different Categories in Punjab

Time Period	Dark/Over-Exploited	Semi Critical + Critical	White/Safe
1984-99	2	0	0
1999-2004	7	-20	-8
2004-17	0	-2	-1

Source: Author's own calculations

Fig.-3

Trend in Compound Annual Growth (%) of Blocks under Different Categories in Punjab



Source: Author's own calculations

All this happened against the backdrop of absolutely free supply of electricity to agriculture since 1997, a jump in net irrigated area by tubewells, and a pickup in growth in area under paddy between 1995-2000 (after a deceleration in the growth rate during the previous periods). Although percentage of over-exploited blocks have hovered between 75-80 per cent since 2004, the stage of ground water development increased from 164 per cent to 199 per cent in 2011 (See Table-9 and Fig.-4), meaning that there was increase in excess of annual draft of ground water over the resource availability and depletion of ground water has been a perennial process. After this, some of the over-exploited blocks shifted to critical and semi critical category, coupled with a decline in the stage of ground water development between 2011-2013, on the back of higher annual rainfall, increased ground water recharge from other sources and lower ground water draft for irrigation. However, 2013-2017 witnessed a pick-up in the number of blocks in the overexploited category (76% to 79%) with the stage of ground water development increasing from 172 per cent to 192 per cent (much higher than 2004 levels).

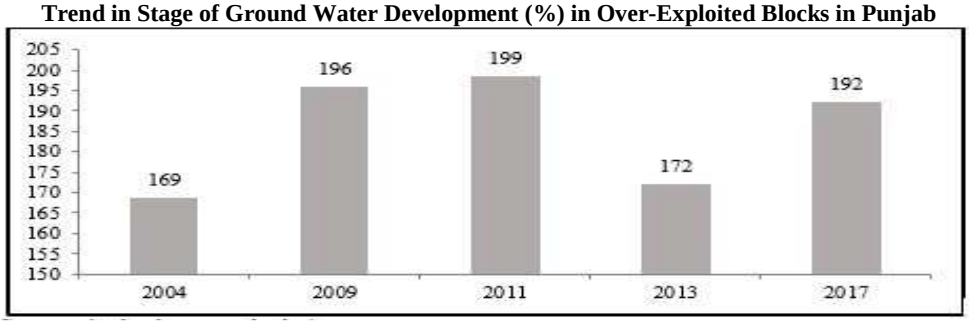
Table-9

Trend in Existing Gross Ground Water Extraction for All Uses as a Percentage of Annual Extractable Ground Water Resources (Stage of Ground Water Development) in Over-Exploited Blocks in Punjab, 2004-17

Year	Stage of Ground Water Development (%)
2004	169
2009	196
2011	199
2013	172
2017	192

Fig.-4

Trend in Stage of Ground Water Development (%) in Over-Exploited Blocks in Punjab



Source: Author's own calculations

A district wise analysis of the extent of ground water extraction and its variation across districts showed that, 77 per cent of the districts have seen an increase in the stage of ground water development between 2004 and 2017. The

dip observed in 2013 was on account of higher rainfall, lower draft for irrigation purposed and higher ground water recharge from other sources, after which all the districts have seen an increase in the stage of ground water development. In Barnala, a district in the central plain region of Punjab, falling in the Malwa region, although all its blocks have been overexploited since the time of its creation as a separate district in 2006, stage of ground water development in the district rose from 197 per cent to 211 per cent in 2017, meaning that net annual draft of ground water was more than twice its net annual availability. In Bathinda, part of the state's cotton belt region; and in Hoshiarpur, falling in Punjab's sub-mountain zone, number of overexploited districts have been constant since 2009, and stage of ground water development has increased overall between 2004 and 2017, with fluctuations observed in the intervening period. Bathinda is approaching 100 per cent level of ground water development (98% as of now), whereas Hoshiarpur already draws excess ground water from its aquifers. Tarn Taran, part of Punjab's Majha region, has witnessed a fall in its stage of ground water development between 2009 and 2017, from 181 per cent to 153 per cent and 100 per cent of its blocks have been overexploited since its creation as a district in 2006 (See Table-10).

Table-10
District Wise Trend in Stage of Ground Water Development (%), 2004-17

Districts	2004	2009	2011	2013	2017	Districts	2004	2009	2011	2013	2017
Amritsar	152	179	180	126	148	Ludhiana	144	170	167	162	183
Barnala		**197**	**204**	**194**	**211**	Mansa	175	214	208	138	141
Bathinda	**93**	**124**	**119**	**93**	**98**	Muktsar	62	70	69	70	74
Faridkot	106	159	160	160	167	Moga	178	203	202	207	229
Fatehgarh Sahib	161	210	210	191	208	NawanShahr	175	112	115	107	116
Fazilka				95	99	Patiala	165	195	196	189	217
Ferozepur	105	141	147	144	164	Pathankot				64	76
Gurdaspur	107	126	127	124	134	Ropar	93	110	110	109	117
Hoshiarpur	**85**	**104**	**102**	**99**	**111**	Mohali		102	103	98	119
Jalandhar	254	229	231	209	239	Sangrur	183	264	283	211	260
Kapurthala	204	235	234	205	224	**Tarn Taran**		**181**	**182**	**133**	**153**

Source: Author's Own Calculations

Additionally, the paddy growing districts (Barnala, Jalandhar, Kapurthala, Fatehgarh (F.G.) Sahib, Sangrur, Patiala, Moga) have a stage of ground water development to north of 200 per cent (i.e., they extracted ground water two times the amount of annual recharge) with 100 per cent of their blocks being over exploited. 36 per cent of the districts, which are a part of central plain paddy belt of the state as of 2017, account for more than 50 per cent of the over exploited blocks in Punjab (57 out of 109) and 50 per cent of the districts in this belt, made up for 85 per cent of the ground water shortfall for future irrigation in

Punjab. These districts face falling rainfall and except NawanShahr, all of them have all of their blocks in the dark over-exploited category (See Table-11).

63.6 per cent of Punjab's total districts have 80-100 per cent of their blocks in the over exploited category as in 2017. Some variation was observed among districts, with Muktsar and Pathankot having no overexploited blocks, and the percentage of overexploited blocks being 25%, 40%, 43%, 60%, 60 per cent and 67 per cent in Fazilka, Hoshiarpur, Bathinda, Ropar, NawanShahr, and Mohali, respectively. None of the districts of Punjab fall in the safe ground water extraction category. Only two districts in Punjab namely, Pathankot and Muktsar fall in the semi-critical ground water category, with the former district being amongst the ten districts witnessing rapidly falling water tables (CGWB 2017), while the latter district faces major issues of water logging and water quality problems. The two cotton growing districts, Bathinda and Fazilka, have stage of ground water development more than 90 per cent but less than equal to 100%, thus falling in the critical category of ground water exploitation (See Table-11). Therefore, 81.8 per cent districts in Punjab have stage of ground water development more than 100%, and hence draw more ground water than is available each year.

Table-11
Changing Ground Water Exploitation Scenario

(Trend in Over-Exploited Blocks as Percentage of Total Blocks), 2004-2017

Districts	2004	2009	2011	2013	2017	Districts	2004	2009	2011	2013	2017
Amritsar	100	100	100	88	100	Ludhiana	82	92	92	92	100
Barnala	NA	**100**	**100**	**100**	**100**	Mansa	100	100	100	80	80
Bathinda	**57**	**43**	**43**	**43**	**43**	Muktsar	-	-	-	-	-
Faridkot	100	100	100	100	100	Moga	100	100	100	100	100
Fatehgarh Sahib	100	100	100	100	100	NawanShahr	60	60	60	40	60
Fazilka	NA	NA	NA	50	25	Patiala	89	100	100	100	100
Ferozepur	70	80	80	83	100	Pathankot				0	0
Gurdaspur	50	57	57	80	80	Ropar	29	60	60	40	60
Hoshiarpur	**20**	**40**	**40**	**40**	**40**	Mohali		67	67	67	67
Jalandhar	100	100	100	100	100	Sangrur	100	100	100	100	100
Kapurthala	100	100	100	100	100	**Tarn Taran**		**100**	**100**	**100**	**100**

Source: Author's Own Calculations

Depletion of Ground Water Aquifers

To get a sharper picture of ground water depletion in Punjab, an analysis of the extent and rate of fall in sub-soil water in Punjab was undertaken for the period 1975-2017. Water table depth in Punjab more than doubled between 1975-2017, June- over- June, from 7.6 meters below ground level (mbgl) to 17.4 mbgl. The October-over-October values are 6.2 mbgl and 17.6 mbgl, for 1975 and 2017, respectively. Water table fell at rate of 25 cm per year during the four decades

since 1975, with the sharpest decline between the decade 2000-2010, when the annual decline rate was double at 50 cm per year (See Table-12). As per the Ground Water Resource Estimation Committee (1997) "an annual average decline in the water table more than 10-20 cm per year for more than a decade is considered a significant water table fall". As the state with the highest stage of ground water development in the nation, with an unarresting increase in demand for water against limited supply, the pressure on Punjab's ground water resources is immense. With 97 per cent of her ground water being used for irrigation, it runs a deficit of 60 per cent in its irrigation extraction-availability ratio, as of 2018. All of this is translated into dangerously falling ground water table, as is visible.

Table-12
Trend in Ground water Depth in Punjab (MBGL)

Period	June	October
1975	7.6	6.1
1980	7.0	6.1
1985	7.1	6.0
1990	7.5	6.2
1995	8.0	6.6
2000	8.2	7.5
2005	6.8	8.1
2010	13.3	12.9
2014	15.2	15.7
2015	15.5	15.9
2016	16.2	16.5
2017	17.0	17.1
2018	17.4	17.6

Source: Author's own calculations

As Paddy became the most demanded crop for production in 70s, because of the support infrastructure in terms of changing irrigation structure towards ground water led irrigation; Minimum Support Price (MSP); assured procurement; rural electrification; and free electricity, tubewell density in Punjab and further tubewell irrigated area saw transformative changes.

All these simultaneously occurring changes, reinforcing each other, have led to falling water tables, making sub-soil water led irrigation unsustainable. A strong positive correlation of 90 per cent was observed between water table depth and tubewell density in Punjab during 1975-2017 (significant at 99 per cent level of confidence). Though the share of net irrigated by tubewells stopped increasing after 2000, water table depth increased at the rate of 5 per cent per annum between 2000-17, a possible explanation for the former can be an underestimation of the area under tubewell since a considerable amount of irrigated land is under conjunctive irrigation in Punjab.

An OLS regression for factors determining draft of ground water for irrigation across 22 districts using data from 2009, 2011, 2013, and 2017 showed that percentage ground water draft for irrigation is significantly dependent, positively on recharge of ground water from sources other than rainfall (since it makes more water available for extraction), net irrigated by tubewells and share of area under paddy (at 5%). It is negatively dependent on the rainfall received in the region (at 1%) (See Table-13)**.**

Table-13
Factors Determining Draft of Ground water for Irrigation in Punjab

	Coefficients	**Standard Error**
Intercept	-33630.55	28,816.94
Recharge from sources other than rainfall (ham)	1.55*	0.13
Average Annual Rainfall (mm)	-127.29*	43.36
Paddy acreage (per cent of GCA)	127113.93**	62,029.66
NIA by tubewell (000 ha)	142638.33*	25,849.56
Multiple R	0.91	
R Square	0.82	
Adjusted R Square	0.81	
F value	80.59**	

Source: Author's Own Calculations

Table-14
District Wise Trend in Average Rate of Water Level Fall (1975-2018) and Average Level of Water Depth (2018)

District	**Rate of Fall in Water Table (mtr/year), 1975-2018**	**Water Table Depth (mtr), 2018**
Barnala	0.72	34.37
Fatehgarh sahib	0.66	22.69
Sangrur	0.66	34.45
Patiala	0.56	30.19
Mohali	0.52	17.52
Moga	0.49	24.83
Jalandhar	0.42	25.29
Tarn Taran	0.32	18.80
Hoshiarpur	0.30	18.95
Kapurthala	0.28	17.60
Amritsar	0.26	15.56
Ludhiana	0.23	19.16
NawanShahr	0.16	19.17
Mansa	0.12	14.60
Ferozepur	0.12	12.97
Faridkot	0.09	7.75
Gurdaspur	0.05	7.98
Bathinda	0.04	16.36
Pathankot	0.04	6.99
Ropar	0.02	10.39
Fazilka	-0.02	6.07

Muktsar	-0.03	3.24

Source: Author's Own Calculations

An analysis of the districts (data averaged across all blocks of a district) shows that the districts witnessing the highest rate of fall per year (since the time data is available) are the central paddy dominated districts – Sangrur, Patiala, Moga, F.G. Sahib, Jalandhar, Ludhiana, Kapurthala, Barnala, Amritsar, Tarn Taran, Mohali. Even Mansa and Bathinda, the South-Western, low rainfall, cotton growing districts, have witnessed a significant rate of decline over the years, as these districts have been witnessing a shift towards paddy and are touched by tubewell driven irrigation system (majorly in conjunction with canals). However, it is pertinent to note that south western districts of Bathinda, Ferozepur and Faridkot actually witnessed rising water tables from deep water tables in 1975, as surface water supplies were diverted from the central zone to this region because of poor ground water quality here. It was from 2005, that these districts started witnessing falling water tables as drainage was improved. Water table in Muktsar rose at the rate of 3 cm per annum from 1995 to 2017, and the district has no area under tubewell irrigation. The top 12 districts (except Hoshiarpur) with the deepest water tables are all part of the central plain zone where depletion pushing factors are in force (See **Error! Reference source not found.**). These districts have falling rainfall trends, high share of paddy as a percentage of gross cropped area (GCA) and 90-100 per cent of their net irrigated area under tubewell irrigation. Districts with more than 20 meters of water table depth, on an average, have 45 per cent of their GCA under paddy and 90 per cent of their GCA under paddy-wheat mono cropping and 89 per cent of the net irrigated area under tubewells. Out of the total ground water depletion between 1990 and 2005, approximately 92 per cent was on account of the central districts in the state (Singh 2011).

Changing Scenario of Tubewell Schemes in Punjab

Table-15
Trend in Tubewell Schemes (in use) by Tubewell Type in Punjab, 1986-2013

Tubewell	Dug-well	Shallow	Deep	Total
1986-87	0.80	99.02	0.18	878579
1993-94	1.21	98.56	0.23	952247
2000-01	0.27	98.82	0.91	1076122
2006-07	0.00	73.10	26.90	1175399
2013-14	0.00	56.61	43.39	1118736

Source: Author's Own Calculations

An analysis based on Minor Irrigation Census Reports for various years (latest data was available for 2013-14) suggests the trend of change in type of tubewell schemes in Punjab. We can see that there has been an increase in number and

percentage of deep tubewell schemes in the state. The share of deep tubewell schemes has increased from a mere 0.2 per cent in 1986-87 to a massive 44.3 per cent in 2013-14. The jump was specifically sharp in the period post 2000-01. There was more than a sixteen-percentage point increase in the percentage of deep tubewell schemes in less than a decade since 2006-07 (See Table-15). This happened against the backdrop of free agricultural electricity for all in 1997, steeply falling area under canal irrigation and deepening ground water table. As Punjab witnessed increased cropping intensity, there was increased need for more reliable and assured irrigation, which led increased area under tubewell irrigation, hence increasing ground water extraction and leading to falling water table and therefore, increased the need for deeper tubewell schemes.

It was seen that between 2006-07 and 2013-14 (See Table-16) number of tubewell schemes in the lower water table depths had decreased, while number of schemes in tubewell depths of more than 70 meters below ground water level (mbgl) increased, indicating severely depleting aquifers in the Punjab state. Percentage of tubewell schemes in 0-70 metre depth decreased from 73.2 per cent to 56.6 per cent in less than a decade, while those in the range of water table depth more than 70 meters increased from 26.8 per cent to 44.3 per cent. During the same period, number of submersible pumps increased by fifty percent from close to 0.6 mn (53%) to more than 0.9 mn (84%), a thirty-one-percentage point increase. Depleting ground water aquifers have made mono-block motors irrelevant, with their reducing from 43 per cent in 2009 to just 28 per cent in 2017 (Ghuman & Sharma, 2018). Such kind of a shift is not only suggestive of the rapidly changing economical ground water availability scene in the state, but has its own equity implications due to initial investment involved, where the large farmers again outrun the smaller category of farmers, thus leaving them behind in the race to the bottom of the water table.

Table-16
Trend in Average Depth of Tubewell Schemes, 2006 vs. 2013

Depth of Schemes (mtr)	2006-07	2013-14
0-20	5.94	11.21
20-40	24.67	14.01
40-60	15.19	14.46
60-70	27.35	16.92
70-90	12.31	21.94
90-110	11.37	14.90
110-130	1.88	3.95
130-150	0.61	1.31
>150	0.67	1.29

Source: Author's Own Calculations

Table-17
Change in Average Horse Power of Tubewell Schemes in Punjab, 1993-2013

Year	Shallow tubewell schemes			Deep tubewell schemes		
	<6 hp	6 -10 hp	> 10hp	<6 hp	6 -12 hp	> 12hp
1993-94	65.60	31.49	2.71	38.74	23.10	38.16
2000-01	65.57	32.10	2.01	41.78	24.94	33.27
2006-07	35.73	41.38	22.88	10.80	52.73	36.46
2013-14	31.32	37.40	31.28	5.84	42.05	52.10

Source: Author's Own Calculations

More supporting evidence of rapidly dropping sub-soil water levels was found by observing the changes in the horsepower of the schemes (See Table-17), in case of both shallow and deep tubewells. In-case of shallow tubewells, the percentage of pumps with horsepower more than 10 HP increased from 2 to 31 per cent since 2000, while the percentage of pumps with less than 6 HP, more than halved. In-case of deep tubewells, percentage of pumps with less than 6 HP declined from 42 to 6 per cent between 2000-2013, while percentage of pumps with more than 12 HP increased from 33 to 52per cent. Changes like falling water table, shift from centrifugal pumps to submersibles and increased horsepower of pumps, are associated with each other. Between 2000-01 and 2006-07, number of shallow and deep tubewells that went permanently out of use due to drying up, witnessed a tenfold dramatic rise, another repercussion of sapped ground water resource (See Table-18 and Table-19).

Table-18
Reasons for Shallow Tubewells Going out of use Permanently

Year	Total	Salinity	Dried up	Others
1993-94	1345	78.2	10.6	11.2
2000-01	1139	60.7	24.0	15.4
2006-07	2747	6.6	91.7	1.7

Source: Author's Own Calculations

Table-19
Reasons for Deep Tubewells Going Out of Use Permanently

Year	Total	Salinity	Dried up	Others
1993-94	64	26.56	1.56	71.88
2000-01	51	54.90	19.61	25.49
2006-07	123	0.00	85.37	14.63

Source: Author's Own Calculations

Primary Data Analysis Based on Farmer Perception on Questions Revolving Ground Water Depletion

Table-20
Percentage of Farmers in the Surveyed Districts Who See a Perceivable Fall in Water Table

	Conjunctive	Tubewell	Overall
Barnala	100	100	100
Bhatinda	25	50	33
Tarn Taran	-	88	88
Hoshiarpur	-	59	59

Source: Author's Own Calculations

The visibility of fall in ground water is more amongst farmers where the ground water is falling at a faster rate, i.e., in Barnala district, followed by Tarn Taran, Hoshiarpur and Bathinda. Because of ground water recharge from seepage of unlined canals, there is less cognizable fall in water table. All the surveyed farmers in Barnala felt that there was considerable depletion of ground water in their region, and even in other districts, the farmers who recognized ground water depletion (See Table-20) felt that though the issue needed to be addressed, they were helpless and were doing everything in their limits to save water (laser land levelling, late planting of paddy, etc.) without compromising on productivity of the crop (paddy).

Table-21
Surveyed Farmers' View on Reasons for Ground Water Depletion

Reason for Ground Water Depletion	Conjunctive	Electric Tubewell only
Paddy cultivation	69	88
Less rainfall	33	42
Free electricity for irrigation	20	33
No supplementary canal water	0	55
Inadequate canal water supply	90	0
Expensive water saving tech.	12	20

Source: Author's Own Calculations

Table-22
Preference of Coping Strategies by Farm Size Holding Across Surveyed Farmers

Preferred Survival Strategies in Face of Ground water Depletion	Marginal and Small	Semi-medium and Medium	Large
Water saving technology	20	**23**	**42**
Cooperative pumping	5	4	7
Deepen existing tubewell	13	11	17
Dig more tubewells	4	5	5
Use more powerful pumps	4	5	7
Buy water	7	1	5
Change cropping pattern	**58**	**68**	**73**
Lease out land	17	10	7
Shift largely to non-farm activity	**21**	10	13
Follow others	**21**	21	13
Do nothing	0	1	0

Table-23
Farm Size Wise Preference for a Coping Strategy Across Surveyed Farmers

Preferred Survival Strategies in Face of Ground water Depletion	Marginal	Semi-medium	Large
Water saving technology	24	24	**52**
Cooperative pumping	33	23	**44**
Deepen existing tubewell	32	25	43
Dig more tubewells	31	**31**	38
Use more powerful pumps	28	28	**44**
Buy water	**53**	7	40
Change cropping pattern	31	**31**	39
Lease out land	**51**	27	22

Shift largely to non-farm activity	**48**	21	31
Follow others	40	35	25

One of the primary reasons cited by farmers for ground water depletion in case of both conjunctive and tubewell only farmers was, the cultivation of Paddy (See Table-21). While 55 per cent of farmers who are solely dependent on tubewellsblamed absence of canal irrigation as a major reason, 90 per cent conjunctive farmers blamed the inadequate supply of water in canals as the reason for depletion of groundwater. Lower rainfall is another cited reason for falling water levels. Free electricity to agriculture was cited by 33 per cent of the solely tubewell using farmers as a potential reason for ground water depletion, as there is no reason to control the number of irrigations (since increased irrigation to paddy is considered to increase productivity of the crop) and because they have no reason to check their electricity bills and hence, keep the motors running. It was noted that within each farmer category, the most preferred strategy amongst all farmers for coping with ongoing and future ground water depletion was changing their current cropping pattern of mostly wheat-paddy rotation. Marginal and small farmers opted to give up farming and shift largely to non-farm income (21% of the farmers), whereas investing in water saving technology was the next most favoured choice by the semi-medium, medium and large category farmers (23 and 42%, respectively) (See Table-22). An analysis of the distribution of the farmers by their response to every coping strategysuggests that, water buying; leasing out land; choice by the semi-medium, medium and large category farmers (23 and 42%, respectively) (See Table-22). An analysis of the distribution of the farmers by their response to every coping strategysuggests that, water buying; leasing out land; and shifting to non-farm activity as a countering strategy was preferred more by the marginal and small farmers because of the resource requirements for such strategies (See Table-23).

Top survival strategy that the farmers would like to adopt in the face of depleting ground water is ‘change the current cropping pattern', which is dominated by paddy and wheat. The next preferred alternative is adoption of water saving technology which is currently also being adopted, but to a restricted level due to lack of supply for hiring (compared to demand), heavy initial buying investment, and in-operability on smaller fragmented lands (due to lower than economical use hours). Leasing of land, digging more tubewells and buying water have been strategies prominently preferred by conjunctive farmers. 2/3rd of the surveyed farmers, urged that there was an immediate need for the government to encourage an adopt ground water preservation strategies in Punjab.

About 50 per cent of the state’s ground water is contaminated with harmful contaminants like arsenic, uranium and fluoride (Bharti 2017), and failing any remedial measures by the government, the rapid depletion of the

usable ground water will continue. According to the Report of the High-Level Expert Group on Water logging in Punjab (2013), excessive irrigation and recharge from irrigation distribution network, along with other factors like topography, unlined canals, poor drainage, etc. in south-west Punjab, have led to water logging to a great extent, leading to salinization and thus unsustainability of land for agriculture. The threat of desertification in the region is real (Shah et al. 2013). Taking cognizance of the fast-depleting sub-soil water in Punjab that is making its further extraction unsustainable, the Punjab State Farmers 'and Farm Workers' Commission (2018), amongst many other recommendations, stressed on the need for watershed management of land and water resources in the state, through the construction of rain harvesting structures and prioritizing recharge of ground water aquifer in overexploited regions. Punjab is staring at a situation of water insecurity, capable of leading the state into a multipronged crisis (Ghuman&Sharma,2018).

Conclusion

Irrigation water use in Punjab agriculture is not sustainable anymore and food production might soon be bounded by its availability, as demand from other sectors is rising and the resource supply is dwindling. Since the potential of an aquifer is limited, over-extraction of ground water is a self-terminating phenomenon. A combination of the current groundwater-based irrigation economy and the extant water intensive paddy cultivation, is leading to water tables falling to uneconomic levels. It is estimated that approximately 79 per cent of the area in Punjab is overexploited. Out of 138 blocks in the state, only 16 per cent fall in the 'white category' of ground water development. It is feared that by 2039, Punjab is likely to completely run of underground water (Vasdev 2019). Punjab's agriculture department predicted that if the current rate of decline in water table continues, ground water available up to 100 m depth will vanish in twelve years, while water available at 300 m will get completely exhausted in the next 20-25 years (Nibber 2019).Falling ground water is not only a problem in itself but also leads to further issues of ground water quality, as depleting water tables are combined with an excess use of fertilizers and chemicals. Since ground water is a non-renewable, open access resource, with rivalry in its exploitation, its management should involve on regulation mining of its stock in each period. A bottom-up institutional set up, where in panchayats and farmers (specifically) are given control over management of natural resources that affect the sustenance of agriculture, is required. There needs to be an overarching policy reform that takes into account sustainable water need of all sectors of the economy, and ensures that resource is allocated to its high value use. It is agreed that 'green growth strategies' in the water sector require a balance between water use and water protection within an integrated water resources management framework. Effective regulation, coordination and management of water sector can help

Punjab sustainably manage its water resources, which at present are facing major quality and availability issues.

There is critical need for rejuvenation of surface water sources, to reduce reliance on sub-soil water, and increase artificial recharge. Recommendations made by both Johl Committee reports (1986 & 2002), stressing on the need for crop diversification away from paddy and wheat rotation and suggesting ways to do the same, need to be given serious consideration for implementation. With 84 per cent of Punjab's GCA under this water guzzling crop combination, an immediate need to tweak the economic instruments in favour of other crops to provide a viable alternative to farmers, is felt. Price incentives (subsidies) to promote water saving and increased efficiency in irrigation application, will save the government from the excessive cost burden it now carries. Easy and affordable availability of water conserving technologies like laser leveller, happy seeder, etc., with increased awareness among farmers, will be a step in the right direction. Further, there is a need to shift technology bias in favour of paddy and wheat towards and other crops like pulses, vegetables, etc. Low cost and easy applicability of more efficient irrigation systems like sprinkler and drip need to be promoted. Lessons from Israel, an extremely water scarce region with a per capita availability of less than 200 cm, can be far reaching in their applicability to Punjab (with cooperation between both governments already under way). She is a land of innovations in water management with its recycling of urban wastewater for use in agriculture, public awareness programs on value of water, coordinated management of the resource with reliable and quality data and public infrastructure investment.

Therefore, as depleting ground water in the state imposes social and economic costs and as productivity of agriculture is stagnating, Punjabi farmers face an impending crisis, unless corrective measures are encouraged and implemented with true grit.

Acknowledgements I would like to thank Punjab's Water Resources Department for allowing access to their unpublished documents and the farmers of Punjab, for their patience and honesty in responding to our interview schedule

References

Bharti, V. (2017). *Just 60% Punjab ground water fit for use*. Retrieved from Dainik Tribune: https://www.tribuneindia.com/news/punjab/just-60-punjab-groundwater-fit-for-use-43185

Ministry of Water Resources, River Development and Ganga Rejuvenation.(Various Years). *Report on Census of Minor Irrigation Schemes.* New Delhi. Minor Irrigation Wing, Government of India.

Central Ground Water Board. (2013,2017). *National Compilation on Dynamic Ground Water Resources of India.*Faridabad. Ministry of Water Resources, Government of India.http://cgwb.gov.in/Dynamic-GW-Resources.html

Central Ground Water Board, North Western Region and Water Resources & Environment Directorate, Water Resources Department, Punjab. (2017). *Ground Water Resources of Punjab State.* Chandigarh and Mohali.

Economic and Stastiscal Organisation, Government of Punjab. (2016-17). *Economic Survey of Punjab.*Chandigarh. https://www.esopb.gov.in/static/PDF/EconomicSurvey-2016-17.pdf

Ghuman, R. (2017). Water Use Scenario in Punjab: Beyond the Sutlej-Yamuna Link Canal. *Economic and Political Weekly, 52*(3).https://www.epw.in/journal/2017/3/punjab%E2%80%94exploring-prospects/water-use-scenario-punjab.html

Ghuman, R. S., & Sharma, R. (2018). *Emerging Water Insecurity in India: Lessons from an Agriculturally Advanced State.* Cambridge Scholars Publishing.

Government of Punjab. (1986). *Expert committee report on diversification of Punjab agriculture.*Chandigarh.

Government of Punjab. (2002). *Expert committee report on agricultural production pattern adjustment programme in Punjab for productivity and growth.* Chandigarh.

ESO, Government of Punjab. (2018). *Statistical Abstract of Punjab.*Chandigarh.

ESO, Government of Punjab. (Various years). *Statistical Abstract of Punjab.*Chandigarh.

Ground Water Resource Estimation Committee. (1997). *Ground Water Resource Estimation Methodology*. Ministry of Water Resources, Government of India. Retrieved from http://cgwb.gov.in/documents/gec97.pdf

ICRISAT. (n.d.). Village Dynamics of South Asia. Retrieved from http://vdsa.icrisat.ac.in/Include/document/all-apportioned-web-document.pdf

Nibber, G. S. (2019). *Punjab stares at a parched future, to run out of ground water in 20 years*. Retrieved from Hindustan Times: https://www.hindustantimes.com/india-news/punjab-stares-at-a-parched-future/story-9Kr3CpL2zsDoPthp0XqKmN.html

Pandey, R. (2014). Ground water Irrigation in Punjab: Some Issues and Way Forward. Retrieved from https://link.springer.com/chapter/10.1007/978-981-10-0197-0_5#:~:text=The%20current%20situation%20of%20groundwater,21.44%20billion%20m3%20availability.

Punjab State Farmers' and Farm Workers' Commission. (2018). *Punjab State Farmers' Policy.*Mohali.

Shah, M., Kulkarni, H., Shah, T., Singh, K., Dhiman, S. C., Jha, G., . . . Jain, A. K. (2013). *Report of the high level expert group on water logging in Punjab*. Planning Commision, Government of India.

Shah, T., Burke, J., & Villholth, K. (2007). Groundwater: a global assessment of scale and significance. In D. Molden, *Water for food, water for life: a Comprehensive Assessment of Water Management in Agriculture* (pp. 395-423). London, UK: Eathscan; Colombo, Srilanka: International Water Management Insititute (IWMI).

Sidhu, H. (2002). Crisis in Agrarian Economy in Punjab. *EPW, 37*(30).

Singh, K. (2011). Ground water Depletion in Punjab: Measurement and Countering Strategies. *Indian Journal of Agricultural Economics, 66*(4), 573-589.

Vasdev, K. (2019). *Why Punjab's ground water might run dry by 2039*. Retrieved from Indian Express: https://indianexpress.com/article/explained/why-punjabs-groundwater-might-run-dry-by-2039-5794435/

Worldwatch Institute. (1998). *State of the World Report.* Washington.

Man & Development
Vol. XLIII No. 4, December 2021,
http://www.crrid.res.in/journal/
ISSN 0258-0438

QUALITY OF SERVICES AND OUT-PATIENT SATISFACTION AT DISTRICT HOSPITALS: EMPIRICAL EVIDENCE FROM HARYANA

Dalbir Singh[1] and Rajesh Kumar Aggarwal[2]

Abstract: Increasing demand for healthcare services necessitates frequent patient satisfaction surveys to evaluate the quality of these services. The purpose of this study is to identify the variables that influence outpatient satisfaction as well as to quantify the effect of those factors on outpatient satisfaction at Haryana's district hospitals (DHs). The paper identified seven factors to assess the satisfaction namely treatment services, registration services, laboratory services, infrastructural services, nursing services, dispensary services and medicine services, and assessed them through exploratory factor analysis. The findings show that these seven extracted factors/components account for 76 percent of the overall variation, suggesting that they have a lot of potential to increase outpatient satisfaction (OPD) at DHs in Haryana. Further, on the basis of confirmatory factor analysis, the study showed treatment services(TSs) component as the key component to predict the satisfaction of outpatients at these hospitals followed by nursing services (NSs), infrastructural services (ISs), laboratory services (LSs), registration services (RSs), dispensary services (DSs) and medicine services (MSs). Hence, the research identifies the areas that need intervention in order to enhance the quality of healthcare services in the State. In addition, the research adds to the current literature by improving knowledge of service quality dynamics and quantifying patient satisfaction with healthcare.

Keywords: Outpatients' Satisfaction, District Hospitals, Haryana, EFA, CFA, KMO, Principal Component Analysis.

[1] Assistant Professor of Economics, MLN College, Yamuna Nagar (Haryana)
Email: dalbirsingheco@gmail.com

[2] Director (Acting), Centre for Research in Rural and Industrial Development (CRRID), Chandigarh and Associate Professor, Population Research Centre (PRC), CRRID, Chandigarh.
Email: aggarwalrka@yahoo.com

Introduction

Hsieh & Kagle (1991) points out that the satisfaction or dissatisfaction of patients availing healthcare services is a complex phenomenon which is closely associated with patient expectations regarding their health status as well as the characteristics of the healthcare system. Johnston (1995) states that identification of the factors influencing satisfaction level of patients has now become a burning issue for the researchers of service sector. IGNOU (2001) states that measuring the patient satisfaction for availing the healthcare services from hospitals is a way of assessing the patients' viewpoint regarding the processes of healthcare, approach of the care providers, cost and quality of care, etc. Because, outpatient departments of the hospital serve as a shop window to healthcare services provided by the hospital to the community and hence is considered as a first medium of contact between the hospital and the patient. Patients availing healthcare services play a role as messengers to spread the good image of the hospital. It is, thus, important for the management of healthcare facilities to improve the quality of healthcare and hence the satisfaction of the patients (Kumar *et al,* 2018). Singh and Aggarwal (2021) states that "Scores of patient satisfaction are widely used to evaluate the quality of services offered at various levels of healthcare institutions. Higher satisfaction scores indicate more effective use of health resources and vice versa. Not only the demand for quality healthcare services has risen over the time, but it has also become essential to measure the efficiency of these services via frequent patient satisfaction surveys." Increasing demands on healthcare institutions have prompted hospital administrators and policymakers to look for more efficient ways/performance drivers to offer health services and improve patient satisfaction (Singh et al., 2017). Therefore, it becomes imperative to identify factors affecting and their impact on outpatients' satisfaction.

Health status in Haryana

Haryana, one of the progressive states of India, has a vast network of Civil Hospitals (70) including Sub-Divisional Hospitals, Community Health Centres (122), Primary Health Centres (534), Sub-Health Centres (2,674), and dispensaries/polyclinics/urban health centres (52) having the mission to improve the quality of life of people (GoH, 2022a). Besides, there are 15 district T.B. Centres/Clinics. The State Government is prioritizing health as is evident from rising budget allocations during last few years (Rs. 5849.34 crores during 2020-21 to Rs. 7613.73 crores during 2021-22 and 8925.52 crores during 2022-23) (GoH, 2022b).

Review of Literature

Mohd & Chakravarty (2014) compared the level of satisfaction from OPD services from a tertiary care hospital in Karnataka, with a sample size of 120 patients comprising Indian Armed Forces personnel, through a pre-structured

questionnaire and found that overall satisfaction was rated low by the group of junior commissioned officers (2.6) as compared to other ranks (3.1). With a sample of 200 patients, Kalaja et al. (2016) evaluated the quality of the services at hospitals in Durres, Albania, and found that patients were satisfied with all five elements of quality namely "reliability", "tangible", "assurance", "responsiveness", and "empathy". Sanjeewa & Senevirathne (2017) conducted a cross-sectional study to assess the satisfaction levels of OPD patients in the teaching hospital of Karapitiya, Sri Lanka by selecting a sample of 251 outpatients. The study found differential levels of satisfaction with different components (10% highly satisfied with the health services of the hospitals, 46% satisfied with courtesy, 44% with the quality of care, 42% with hospital infrastructure 25% with convenience, and 23% with treatment costs, etc.) However, "waiting time to seek a doctor's service" and "counter services" were main reasons of dissatisfaction. Kumar et al. (2018) assessed the satisfaction with OPD services from patients in a tertiary care hospital, Kolkata in 2016 by selecting 500 outpatients from different departments on different factors like "outpatient department services", "waiting time for outpatients", "cleanliness in hospital", "privacy of the patients", "any problem faced during health check-up", and "overall satisfaction". Results of the study depicted that most of the patients were satisfied with all the services. The study highlighted the problems of long waiting times and improper privacy of the patients. The study concluded that optimal care for the patients can be provided by combining both the medical and social aspects of the patients. Liu & Fang (2019) identified factors affecting patient satisfaction using factor analysis by selecting 2,626 patients from 13 hospitals in Wuhan city in the Hubei province of China. The study coined three components namely medical service, expenditure, and convenience. The study found that young patients were more concerned about medical expenditure whereas aged patients were more concerned about medical services and patients with medical policies were more concerned about the quality of services. The main reasons for dissatisfaction were higher expenditure at high-level hospitals and quality of services at low-level hospitals. Kaur, et al. (2020) conducted an exploratory study for outpatients and inpatients in public health facilities in the State of Punjab in 2016 by selecting one DH, one SDH, two CHCs and six PHCs randomly from each district of Punjab by interviewing a total of 3,278 outpatients (OPD) and 1,614 in-patients (IPD). The study found that majority of OPD and IPD patients were satisfied with the indicators identified in the study. Long waiting time during lab tests and x-rays was the main reason for dissatisfaction for OPD patients while inpatients were dissatisfied with the cleanliness of bathrooms and wards.

The review of literature did not find any noticeable study indicating the variables impacting outpatient satisfaction in Haryana. The present study contributes to the literature by suggesting some important policy inputs. It

evaluates the services offered to various groups of outpatients throughout Haryana's DHs. We have purposefully limited our research to the DHs in this study since these units offer “a comprehensive range of essential, preventative, curative, and rehabilitative health care services to the whole district population”. The research also aims to determine the influence of service quality on outpatient satisfaction at these institutions, which might be valuable in determining future course corrections. The current research looks at the components that influence performance (performance drivers) and proposes the sort of intervention programme needed to increase DHs in Haryana.

Rationale

Satisfaction components of healthcare can be used as performance drivers of healthcare institutions that can be used as a managerial control tool to pressurize the organizers to improve the overall health management system in the form of improving strategic decision making from supply side as well as from demand side by incorporating patient expectations from health institutions, optimal allocation of existing and new resources, monitoring the performance of the health institutions from various dimensions and to improve the goodwill of public hospitals in comparison to private hospitals in healthcare industry. NSSO 75th Round Survey points out that only a limited number of patients (25% from rural areas, and 10% from urban areas) availed treatment for non-hospitalized illness episodes from some public hospital in Haryana (GoI, 2018). In the light of above, it becomes even more important to assess different service-quality components at DHs. Such assessments are useful for having a demand-side perspective and also better equip health planners to make more appropriate allocation of resources in order to seek best returns from invested resources.

Objectives

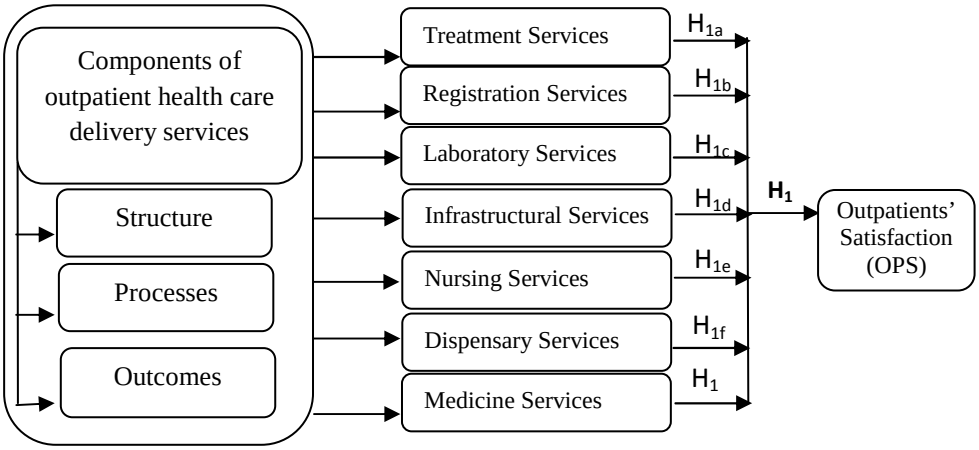
The paper measures the impact of the healthcare delivery services on outpatient satisfaction across the DHs in Haryana. Since the outpatient satisfaction varies across different factors, for this study, these factors have been classified into seven categories namely registration services, treatment services, infrastructural services, nursing/attendant services, dispensary services, laboratory services, and provision of medicines. The respondents have been classified by their socio-economic and demographic characteristics and an attempt has been made to identify the factors affecting the service quality, In addition, paper recommends some important corrective measures or intervention programmes towards better performance.

Conceptual Framework

The conceptual framework of the present paper to identify the components affecting the satisfaction of outpatients is based on the Donabedian Model (1966) of healthcare assessment. To assess the healthcare system, Donabedian

categorised it into three main components namely; structure (staff, types of equipment, number of buildings, financing sources, etc.), processes (technical and interpersonal excellence), and outcome (the impact of the services on the patients' satisfaction). To fully assess the performance of any healthcare system, Donabedian suggested measuring the three components for the entire assessment of the performance of healthcare institutions. So, this study framed the conceptual framework (shown in Fig. 1) based on the aforesaid theoretical framework for outpatients' satisfaction at DHs in Haryana.

Figure-1
Conceptual Framework



Hypothesis

On outpatient services at district hospitals in Haryana, the research tests the following hypothesis.

H_1: Components of healthcare services (TSs, RSs, LSs, ISs, NSs, DSs, and MSs) have a significant positive effect on outpatient satisfaction at Haryana's district hospitals.

Material and Methods

This study is descriptive and explorative and uses primary data collected from 220 out-patients (10 out-patients from each district hospital and two from each major department namely: General Surgery, General Medicine, ENT/Eyes, Gynecology, and Orthopaedics) from all the 22 District Hospitals in Haryana during September 2019-January 2020 through a structured questionnaire using the SERVQUAL model used by Parasuraman, et al. (1985). All questions of the survey were phrased using a five-point scale ranging from highly dissatisfied (1) to highly satisfied (5) as suggested by Likert et al. (1934). Two out-patients from each of the above-mentioned departments were selected at the time of exit (after availing of medical treatment from the hospital).

To attain the objectives of the study, Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were applied after the application of the Kaiser-Meyer-Olkin (KMO) test of sampling adequacy and Bartlett's test of sphericity. To determine the number of underlying factors, an Eigenvalue > 1 criterion was employed. The varimax rotation of factors was used to rotate the solutions and to obtain more interpretable results (Hair, et al. 2010). Finally, CFA was applied to corroborate the EFA findings and to determine the impact of extracted factors on the satisfaction of outpatients.

Results

Socio-economic and demographic characteristics of surveyed out-patients

Table-1

Socio-economic and demographic characteristics of outpatients at DHs in Haryana

Background characteristics of respondents		Male % (n)	Female % (n)	All % (N)
Age (Years)	<19	11.3 (15)	10.3(9)	10.9 (24)
	19 to 40	32.3(43)	62.1 (54)	44.1 (97)
	41 to 60	39.1(52)	21.8 (19)	32.3 (71)
	> 60	17.3 (23)	5.7 (5)	12.7(28)
Marital Status	Married	24.1 (32)	83.9(73)	47.7(105)
	Unmarried	75.9 (101)	16.1 (14)	52.3(115)
Education	Illiterate	18.8(25)	18.4 (16)	18.6 (41)
	Primary	17.3 (23)	11.5 (10)	15.0 (33)
	Secondary	32.3(43)	42.5 (37)	36.4 (80)
	Higher Secondary	15.0 (20)	16.1 (14)	15.4 (34)
	Graduate	15.8 (21)	11.5 (10)	14.1 (31)
	Post Graduate	0.7(1)	0 (0)	0.4 (1)
Income(Rs.)	10000 or less	47.4 (63)	55.2 (48)	50.4 (111)
	10001-15000	31.6 (42)	37.9(33)	34.1 (75)
	15001-20000	11.3 (15)	3.4(3)	8.2 (18)
	20001-25000	2.3 (3)	1.1(1)	1.8(4)
	25001-30000	3.0(4)	1.1(1)	2.3 (5)
	30001-40000	3.0(4)	1.1(1)	2.3 (5)
	40001-50000	0.7(1)	0 (0)	0.4(1)
	> 50000	0.7(1)	0(0)	0.4(1)
Type of Residence	Rural	57.1(76)	50.6 (44)	54.5(120)
	Urban	42.9 (57)	49.4(43)	45.4(100)
Occupation	Government Service	12.8(17)	2.3(2)	8.6(19)
	Business	18.0(24)	6.9(6)	13.6(30)
	Agriculture	21.0(28)	3.4(3)	14.1 (31)
	Labour	15.0(20)	6.9(6)	11.8(26)
	Housewife	0.0 (0)	69.0(60)	27.3 (60)
	Retired	9.8(13)	0 (0)	5.9 (13)
	Students	18.0(24)	11.5 (10)	15.4(34)
	Private Job	0.7(1)	0 (0)	0.4 (1)
	Unemployed	4.5(6)	0 (0)	2.7(6)
All		**60 (133)**	**40 (87)**	**100 (220)**

Source: Outpatient Survey.
Note: Figures in parenthesis denote the Total.

The socio-economic and demographic features of 220 outpatients from all Haryana DHs are shown in Table 1. The proportion of male-female was 60:40, according to the gender distribution. The age distribution revealed that the most (44%) outpatients were between the age group 19-40 followed by 41-60 years (32%), about 13 percent greater than 60 years, and about 11 percent less than 19 years. Forty-eight percent outpatients were married while the others were unmarried. The educational composition of these respondents differed a lot (19% illiterate, 15% up to primary, 36% up to secondary, 15% up to higher secondary and 14 percent graduate and less than one percent post-graduates). Nearly 50 percent of outpatients reported their monthly income less than Rs. 10001, 34 percent between 10001-15000 and only eight percent between Rs. 15001-20000 and seven percent above Rs. 20000 per month. Forty-five percent OPD patients were from urban areas and the remaining from rural areas. The occupational characteristics of these outpatients shows that 51 percent of them were not working (27% housewives, 15% students, 6% retired and 3 percent unemployed) while 49 percent were working (14% in agriculture, 14% in business, 12% as labourer, and 9% in government or private jobs). From the above characteristics, it seems evident that DHs in Haryana are catering mainly to lower-income groups and less educated households.

Bartlett's Test and KMO Test

Before applying the EFA, the KMO test was applied to measure the adequacy of the sample size. According to Hair et al. (2008), the value KMO measure for overall fit as well as for each individual component must be larger than 0.5. The BTS test examines the hypothesis of correlation matrix is an identity matrix meaning by that all the diagonal elements of the data set are one whereas off-diagonal elements are zero. Application of EFA depends upon the fact that the significant result of this test ($p < 0.05$).The values of both of the tests are significant as shown in Table 2 indicating the sufficient sample size is for the application of EFA.

Table-2
The KMO and the Bartlett's Test

Test Statistics		Calculated Value
Sampling Adequacy Test (KMO Measure)		**0.829**
BTS	Approx. Chi-Square	**5525.697**
	Df	351
	Sig.	0.000

Source: Authors' calculations based on Outpatient Survey.

Exploratory Factor Analysis (EFA)

After testing the adequacy and sphericity, the principal component analysis (PCA) along with varimax rotation was used to perform factor analysis and 27 items were finalized for the factor analysis. In the present study, factors having Eigen value > 1 are taken as factors. The results of the variance along with Eigen values of seven factors are depicted in Table 3.

Table-3
Results of Total Variance Explained

Component	Initial Eigen Values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	Percent of Variance	Cumulative Percent	Total	Percent of Variance	Cumulative Percent	Total	Percent of Variance	Cumulative Percent
1	8.889	32.922	32.922	8.889	32.922	32.922	5.736	21.246	21.246
2	2.926	10.838	43.760	2.926	10.838	43.760	3.222	11.932	33.177
3	2.168	8.030	51.789	2.168	8.030	51.789	2.568	9.509	42.687
4	2.087	7.729	59.518	2.087	7.729	59.518	2.480	9.185	51.871
5	1.724	6.387	65.905	1.724	6.387	65.905	2.342	8.675	60.547
6	1.484	5.496	71.401	1.484	5.496	71.401	2.250	8.332	68.879
7	1.262	4.676	76.076	1.262	4.676	76.076	1.943	7.198	76.076
8	.982	3.638	79.714						

Source: Authors' calculations.

In Table 3, column 3 depicts the Eigen values >1 after factor extraction. The value under the column "cumulative percent" indicates that the seven extracted factors having Eigen value >1 explains 76.1 percent of the total variance suggesting that these seven factors are important for further investigation.

Extracted factors/components of outpatient satisfaction and their reliability

Hair et al. (2008) stated that while deciding the number of elements to extract, it is critical to evaluate the variables' nature and give them meaningful names. The factors are named after prior research projects and variables. The extracted seven factors are treatment services, registration services, laboratory services, infrastructural services, nursing services, dispensary services, and medicine services. To assess the reliability of the construct the "Cronbach's alpha coefficient" is commonly used and recommended lower limit for reliability is 0.7 although it may be 0.6 in exploratory research (Cronbach, 1951). Table 4 depicts factor loadings, their nomenclature along with the reliability test values of the factors and communalities of all the items.

Table-4
Factor loadings, communalities and reliability of extracted outpatient factors

Factors	Factor Loading	Percent of Variance	Cronbach's Alpha	h^2
Factor 1: Treatment Services (TSs)		21.246	0.956	
TS1 Received proper guidance regarding the disease	0.939			0.946
TS2 Doctor answering the Queries promptly	0.938			0.939
TS3 Counseling by the doctors	0.927			0.905
TS4 Approach of the doctors	0.891			0.878
TS5 Time spent by doctor in Consultation	0.884			0.837
TS6 Overall satisfaction from the hospital	0.622			0.649
TS7 Outpatients' willingness to revisit/ recommend hospital services to others	0.619			0.642
Factor 2: Registration Services (RSs)		11.932	0.850	
RS1 Formalities in registration counter	0.889			0.883
RS2 Information/ help provided by the receptionist	0.883			0.828
RS3 Approach of the Receptionist	0.735			0.770
RS4 Waiting time in registration lines	0.731			0.587
Factor 3: Laboratory Services (LSs)		9.509	0.776	
LS1 Response of the laboratory staff	0.765			0.789
LS2 Availability of laboratory staff	0.738			0.788
LS3 Availability of the required laboratory test services	0.732			0.594
LS4 Availability of latest equipments	0.711			0.593
Factor 4: Infrastructural Services (ISs)		9.185	0.786	
IS1 Drinking water facility in Hospital	0.860			0.792
IS2 Condition of the toilets/washrooms	0.819			0.743
IS3 Hygienic condition of the waiting area	0.610			0.604
IS4 Availability of the chairs for sitting in waiting area	0.594			0.549
Factor 5: Nursing Services (NSs)		8.675	0.835	
NS1 Assistance given by nurses/Attendants	0.884			0.892
NS2 Behavior of the nurses/Attendants	0.871			0.902
NS3 Availability of the nurses/Attendants	0.485			0.498
Factor 6: Dispensary Services (DSs)		8.332	0.764	
DS1 Behaviour of the staff at dispensary	0.850			0.796
DS2 Availability of staff for dispensing of medicines	0.800			0.727
DS3 Waiting time in queue for medicines	0.724			0.638
Factor 7: Medicine Services (MSs)		7.198	0.919	
MS1 Availability of medicines	0.915			0.889
MS2 Prescription of medicines by the Doctor (inside/outside)	0.913			0.883

Source: Authors' calculations.
Note:'$h^{2'}$ denotes values of communalities

Confirmatory Factor Analysis (CFA)

To confirm the results of EFA, the CFA model was conducted as shown in Fig.2. Various indices of model fit and their cut-off criteria were used to examine the goodness of fit of the model. The results of model fit indices and their cut-off criteria are exhibited in Table 5.

Figure-2
The CFA Model with Standardised Factor Loadings

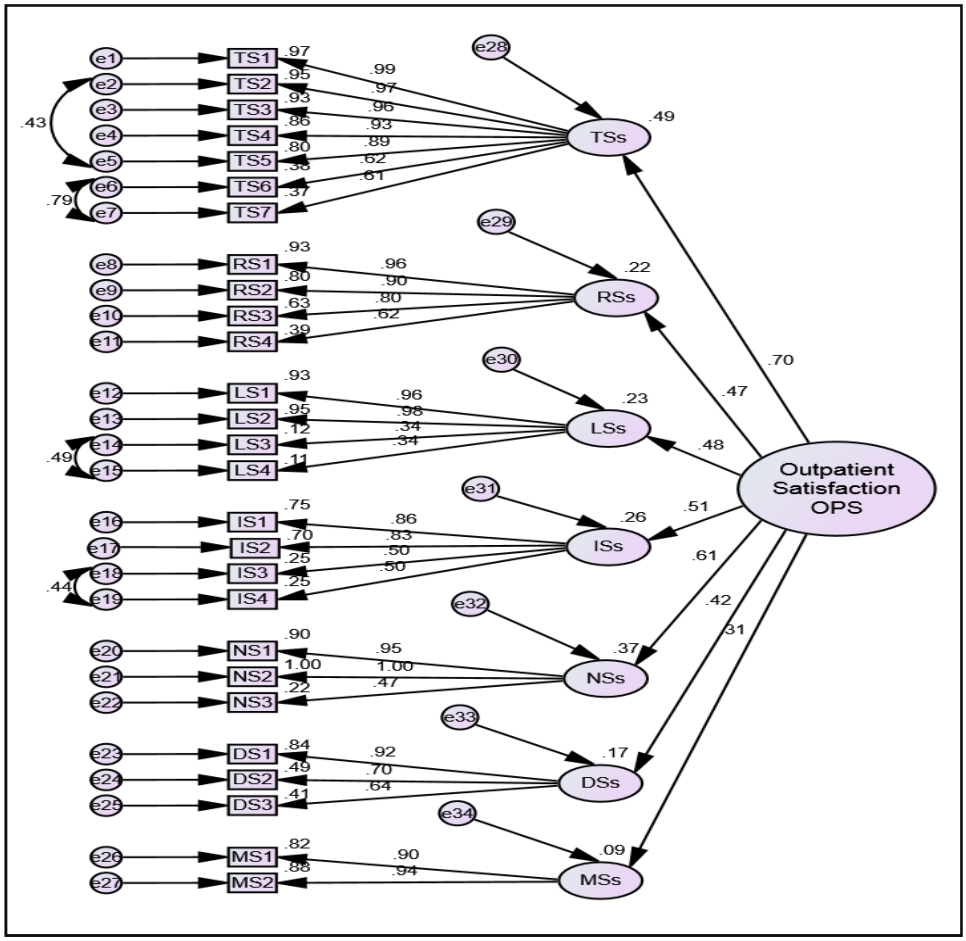


Table 5 shows that the results of the Goodness of fit measures of the CFA Model have been categorized into three groups namely indices of absolute fit, comparative fit indices, and indices of parsimonious fit. Column 3 depicts that almost all the fit indices have values according to the recommended cut-off criteria in the measurement model of CFA. So, based on these results, it is concluded that the proposed model of the present study is good.

Table-5
Goodness of fit indices for CFA Model

Goodness of Fit Measures	Cutoff Criteria	Measurement Model of Outpatient Satisfaction
Indices of Absolute Fit		
Distinct Parameters	--	130
Degrees of Freedom (DF)	--	626
Chi-square (CMIN)	--	1437.220
CMIN/DF	≤ 3.0	2.296
Goodness of Fit Index (GFI)	≥ 0.90	0.797
Adjusted Goodness of Fit Index (AGFI)	≥ 0.90	0.754
Standardised Root Mean Square Residual (SMSR)	≤ 0.10	0.060
Indices of Comparative Fit		
Tucker-Lewis index(TLI)	≥ 0.90	0.916
Normed Fit Index (NFI)	≥ 0.90	0.876
Comparative Fit Indices (CFI)	≥ 0.90	0.925
Incremental Fit Indices (IFI)	≥ 0.90	0.926
Indices of Parsimonious Fit		
Parsimony ratio (PRATIO)	≥ 0.50	0.892
Parsimony adjusted to NFI (PNFI)	≥ 0.50	0.781
Parsimony adjusted to CFI (PCFI)	≥ 0.50	0.825
Parsimony Goodness of Fit Index (PGFI)	≥ 0.50	0.660
Root Mean Square Error of approximation (RMSEA)	≤ 0.05	0.054

Source: Authors' calculations based on outpatient survey

Testing the Hypothesis

To test the hypothesized path or determine the individual effect of the seven factors on the outpatients' satisfaction, second-order CFA was run as shown in Fig. 2. The results of second-order CFA are shown in Table 6.

Table 6 shows that all the standardized regression weights (factor loadings) are significant as all the t-values (CR) are higher than 1.96 and P-values are less than 0.5 (*** indicates P<0.001). Thus, all the identified factors namely TSs (0.702), RSs (0.474), LSs (0.482), NSs (0.605), MSs (0.306), DSs (0.417), and ISs (0.513) have a significant and positive effect on outpatient satisfaction (OPS). So, it can be concluded that the proposed hypothesis (H1) and its sub-parts are also supported by the present research which leads to conclude that all the above-mentioned factors significantly affect the level of OPS. The table

further shows that the TSs are found to be the main factor (0.702) to affect the satisfaction of outpatients of district hospitals followed by NSs, ISs, LSs, RSs, DSs, and MSs. Thus, the present study confirms that the service quality components/factors definitely affect outpatient satisfaction at Haryana's DHs.

Table-6
Results of Hypothesis Testing

Hypothesized Path	Hypothesis	Standardized Regression Weights (Factor Loadings)	Unstandardized Regression Weights (Factor Loadings)	Standard Error (SE)	t-values (CR)	P-values
TSs←OPS	H_{1a}	0.702	1.000	Fixed	Fixed	---
RSs←OPS	H_{1b}	0.474	0.326	0.061	5.333	***
LSs←OPS	H_{1c}	0.482	0.459	0.085	5.397	***
NSs←OPS	H_{1d}	0.605	0.795	0.126	6.312	***
MSs←OPS	H_{1e}	0.306	0.380	0.112	3.383	***
DSs←OPS	H_{1f}	0.417	0.372	0.081	4.608	***
ISs←OPS	H_{1g}	0.513	0.631	0.119	5.312	***

Source: Authors' calculations based on outpatient survey.
Note: OPS- Outpatient Satisfaction, *** indicates P<0.001

Policy Implications and Discussion

The present study points out that the identified service quality components contribute significantly toward the outpatients' satisfaction at Haryana's DHs. Some of the implications emanating from the study are as under:

The social, demographic, and economic characteristics of the sampled outpatients reveal that outpatients with higher education, higher income belonging to urban areas, and occupations such as services are visiting less to government DHs. These findings are supported by the 75th round of NSSO which revealed that only 25 percent (Rural) and 10 percent (Urban) households visited a public health facility for any non-hospitalized illness episode (GoI, 2018). Such findings strongly indicate the need to upgrade quality standards at these hospitals.

The results of EFA also highlight the fact that 76 percent of the variation is being explained by the seven extracted factors/components which indicates that satisfaction of outpatients can be improved by focusing on these components at Haryana's DHs Guidelines are required to be framed to improve the quality-standards based on these findings.

The results of the CFA show that all the extracted factors of service quality are statistically significant. Treatment services significantly influence the satisfaction from OPD services. This quality of treatment services attracts more patients to the hospital and increases patient loyalty to the hospital. Simply availability of infrastructural facilities and equipment is not sufficient for the satisfaction of outpatients. The availability of experienced doctors during working hours, better behavior towards patients, the need for proper guidance, and time devoted by the doctor to listen to patients' grievances are the prime factors affecting the satisfaction of patients. Further, CFA results show that not only the treatment services are essential but other services such as registration, laboratory services, infrastructural services, nursing services, dispensary, and medicine services are found to be equally important for patient satisfaction.

Observations during field survey and suggestions by respondents

During the field survey, DH Bhiwani, DH Charkhi Dadri, DH Faridabad, DH Fatehabad, DH Jind, DH Kurukshetra, DH Karnal, DH Mewat, DH Narnaul, DH Palwal, and DH Yamuna Nagar were found to have inadequate health care services (medical, infrastructural, laboratory, and medication). Most of the medical staff members were found to be engaged in non-primary duties. Among the issues raised by respondents included long waiting time at registration counters, long waiting time at sample collection centres and also for receiving test reports from laboratories, inadequate number of registration counters, scarcity of medicines, lack of infrastructural facilities such as availability of seating facilities for patients and attendants, lack of drinking water facilities, unhygienic conditions of toilets/washrooms, etc. Some of the obstacles to service delivery were related to insufficient consultation time, lack of responsiveness to patient concerns, and prescription of medicines from market. Most of the respondents indicated their desire to have all services to be available under one roof. These services must be provided efficiently and optimally by hospital administration/policymakers. Every district in Haryana has a Quality Assurance Cell (QAC) to oversee and monitor the quality of services provided by the DHs. This cell must periodically recommend and implement systematic changes wherever necessary.

Conclusions

The present paper examines the elements that affects outpatient satisfaction at all district hospitals in Haryana. Through exploratory factor analysis, seven components were identified: treatment services, registration services, laboratory services, infrastructural services, nursing services, dispensary services, and medication services (EFA). The CFA was used to test the hypothesis that these extracted components had a substantial impact on outpatient satisfaction at DHs. TSs, followed by NSs, ISs, LSs, RSs, DSs, and MSs, was revealed to be the most

relevant factors in predicting outpatient satisfaction in DHs. This research identifies the areas of concern that need systematic actions to correct the general course and enhance the overall quality of health care. It helps hospital administrators and policymakers to better manage their resources and enhance service quality by focusing on key aspects (performance drivers).

Limitations and Scope for Future Research

The current research gathered opinions from outpatients at a specific point in time throughout the survey period and was unable to compare the situation before and after that period. Only the highest levels of referral hospitals, i.e. District Hospitals are included in the study. Due to time and expense constraints, other hospitals such as Community Health Centres, Sub-Divisional Hospitals, and Primary Health Centres could not be included in the research.

Ethical Statement

Every interview schedule included a permission form. For involvement in the research, every respondent gave his/her oral permission. There was no requirement for ethical approval under the institutional policy since the research did not require any medical, clinical, or potentially dangerous operation or trial.

Acknowledgements

The current study is based on Mr. Dalbir Singh's ongoing doctoral research work at the Centre for Research in Rural and Industrial Development (CRRID), Chandigarh, under the guidance of Dr. Rajesh Kumar Aggarwal, Director (Acting) and Associate Professor, Population Research Centre (PRC). The data for the study was collected by seeking due approval from the Director-General, Department of Health and Family Welfare, Government of Haryana, through letter number 8/65-1HE/2019/MH/1661-1683 dated 06-09-2019. The authors are very grateful to all State level and district level Officers besides medical and non-medical staff at all DHs for providing necessary support in data collection. We are acknowledge the co-operation of the respondents during the exit interviews.

Declaration of Conflicting Interests

In terms of the research work's publishing and authorship, there are no conflicts of interest.

References

Cronbach, L.J. (1951) Coefficient alpha and the internal structure of tests. *Psychometrika, 16*(3), 297-334.

Donabedian, A. (1966). The effectiveness of quality assurance. *International Journal for Quality in Health Care*, 8 (4), 401-407.

Government of Haryana. (2022a). *Economic survey of Haryana 2021-22.* Haryana: Department of Economic and Statistical Analysis Haryana. Available at: http://web1.hry.nic.in/budget/esurvey.pdf

Government of Haryana. (2022b). *Budget*. 2022-23, Available at: http://web1.hry.nic.in/budget/

Government of India, Ministry of Health and Family Welfare (2012). *Indian Public Health Standards (IPHS).* Guidelines for District Hospitals (101 to 500 Bedded), Revised 2012.

Government of India. (2018). *Key Indicators of Social Consumption in India: Health.* Ministry of Statistics and Programme Implementation, National Sample Survey Office, available at : http://www.mospi.gov.in/sites/default/files/publication_reports/KI_Health_75th_Final.pdf

Hair Jr., J.F., Black, W.C., Babin, B.J. and Anderson, R.E. (2010). *Multivariate Data Analysis: A Global Perspective*. 7th Edition, Pearson Education, Upper Saddle River.

Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (2008). *Multivariate Data Analysis*. New Jersey: Prentice-Hall International.

IGNOU (2001), Patient Satisfaction, *Organisation and Management of Hospitals, Practical Manual of PGDHHM,* 3, 14–25.

Johnston, R. (1995). The zone of tolerance: exploring the relationship between service transactions and satisfaction with the overall service. *International Journal of Service Industry Management*, 6(2), 46-61.

Kaur, M., Bashar, A., Singh, T., & Kumar, R. (2020). Cross-Sectional Study of Clients' Satisfaction with Outpatient and Inpatient Services of Public Health Facilities of a North Indian State, *Health services insights*, 13, 1-8.

Kumar, P., Anjan, A., Moumita, R., Indu, R., Sangita, B., & Anup Kumar, D. (2018). Assessment of Patient Satisfaction in Outpatient Department of a Tertiary care Hospital in West Bengal, India: a questionnaire based study, *International Journal of Community Medicine and Public Health*, *5*(9), 3919-3923.

Likert, R., Roslow, S., & Murphy, G. (1934). A simple and reliable method of scoring the Thurstone attitude scales. *The Journal of Social Psychology*, *5*(2), 228-238.

Liu, L., & Fang, J. (2019). Study on potential factors of patient satisfaction: based on exploratory factor analysis. *Patient preference and adherence*, 13, 1983.

Mohd, A., & Chakravarty, A. (2014). Patient Satisfaction with Services of the Outpatient Department, *Medical Journal Armed Forces India*, 70 (3), 237-242.

Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1985). A conceptual model of service quality and its implications for future research. *Journal of marketing*, *49*(4), 41-50.

Sanjeewa, G., &Senevirathne, R. (2017). Patient Satisfaction with Health Care Services

Delivered at the Out Patients Department-Case Study-at Teaching Hospital Karapitiya, Sri Lanka. *Health Care Current Reviews*, 5 (2), 1-5.

Singh, Dalbir and Aggarwal, Rajesh Kumar (2021). Service Quality Components and Inpatients Satisfaction at District Hospitals in Haryana: An Empirical Analysis. *Journal of Health Management*, 2021, Vol. 23, No. 4, p. 770-785.

Singh, S., Singh, D., & Singh, K. (2017). Efficiency and Total Factor Productivity of Public Hospitals in Haryana (India): A Data Envelopment Analysis. *International Journal of Advances in Management and Economics*, 6(2), 71-84.

Man & Development
Vol. XLIII No. 4, December 2021,
http://www.crrid.res.in/journal/
ISSN 0258-0438

FUNCTIONING OF PUBLIC DISTRIBUTION SYSTEM IN KANDI BELT OF PUNJAB AND HARYANA

Savita Ahlawat[1], Khushvir Singh Saini[2] and Dhian Kaur[3]

Abstract: Public Distribution System is one of the largest food programmes introduced by government of India to ensure the food security at the household level. Historically, this scheme was introduced as a rationing system before Independence which evolved in several phases over time. Under this scheme essential commodities such as wheat, rice, pulses and kerosene have been provided at subsidized prices to poor people for sustaining their livelihoods. In the present study, an attempt has been made to analyse and evaluate the functioning of Public Distribution System at household level in hilly areas of Punjab and Haryana States. The perception and satisfaction level of the beneficiaries regarding the functioning of PDS have also been examined to understand the ground level situation. This study is based on both secondary and primary data sources. Results showed that despite having hilly topography the rationing depots are located in all over the belt. But in some areas the beneficiaries are facing many problems such as non-availability of food grains, unsatisfactory quality and quantity of commodities, incorrect weights and measures, rude behaviour of FPS owners and unfair distribution of food grain etc. Thus, in order to make this programme successful, rigorous steps should be taken such as transparency in ration card allotments, electronic weighing machines, linking ration card with Aadhaar card etc.

Keywords: Availability, Effectiveness, Fair Price Shop, Households Food Security, Poverty, Public Distribution System

[1] Former Ph.D. Scholar, Department of Geography, Panjab University Chandigarh
Email: savi.ahlawat31@gmail.com

[2] Assistant Professor, Department of Geography, Baba Farid College, Bathinda
Email: khushvir.saini@gmail.com

[3] Professor, Department of Geography, Panjab University Chandigarh
Email: dhiank@pu.ac.in

I. Introduction

Providing food to the people is the responsibility of the centre and state governments. In this context, the central and state governments have introduced a number of programmes and policies over time for ensuring the adequate availability of foodgrains and other commodities among the general masses in the country (Kumar, 2014; Kumar et al., 2015; Joshi, 2016). Some of these programmes provide subsidised food while some others provide employment opportunities for income generation. The largest subsidised food programme was started during the 2nd World War in the form of rationing system in Bombay (1939) which was especially meant for the urban areas. Subsequently it was extended to other cities and as many as 771 cities were covered under this till 1946 (Kishore & Chakrabarti, 2015; Chander et al. 2017). This rationing system was totally dependent on the imported foodgrains. After independence, this rationing system was reintroduced as Public Distribution System (PDS) in the First Five Year Plan and was extended to rural areas (Bhatia, 1985).Along with foodgrains, other essential commodities were also added in PDS. After Green Revolution, the coverage of PDS was extended and it evolved as a universal scheme for the distribution of subsidised food to the poor. A brief evolution history of PDS in India has been depicted in Table 1.

Table-1
Evolution of Public Distribution System in India

Name of Programme	Time	Details
Rationing System	World War II	Subsidised food for urban areas
Public Distribution System (PDS)	1950s	General entitlement scheme
Revamped Public Distribution System (RPDS)	1992	Area based approach
Targeted Public Distribution System (TPDS)	1997	Income based approach
Annapurna Scheme	2000-01	Provide free of cost foodgrains to the poor senior citizens
Antyodaya Anna Yojana (AAY)	2001	Provide highly subsidised foodgrains to poorest of the poor
Food Security Act	2013	Provide legal right to food to the poor

Source: Ministry of Consumer Affairs, Food and Public Distribution, Govt. of India

Apart from the PDS, government has also initiated a number of grain based welfare schemes such as Antyodaya Anna Yojana (AAY), Annapurna Scheme, Midday Meal Scheme to further support the poor families, the disabled and aged who do not have regular income support. All these schemes were used primarily to make the PDS more focused and targeted towards the poor and to help reduce the overstock of food grains in the central reserves.

The government has also introduced the National Food Security Act (NFSA, 2013) for providing food security to poor people (Tanksale & Jha, 2015). Presently, this act covers up to 75 percent rural and 50 percent urban population of the country. Under the NFSA, two types of beneficiary households have been identified; Priority Households (PH) and AAY households. The priority households are entitled to receive 5 kg foodgrains per person per month at the issue prices of Rs. 3.00, Rs. 2.00 and Rs. 1.00 per kg for rice, wheat and coarse grains respectively(Sandhu, 2014; Varadharajan, 2014). However, the existing AAY households receive 35 kg of foodgrains per household per month. Thus, over time, the PDS has evolved and it changed from a simple rationing system to a social safety system.

At present, Public Distribution System (PDS) is considered as the most important food security network introduced by the Government of India under the Ministry of Consumer Affairs, Food and Public Distribution. This is perhaps the largest distribution network of its kind in the world and has also evolved as an important poverty alleviation programme of the central government (Svedberg, 2012). It functions with the help of 4.63 lakh Fair Price Shops spread all over the country. It is operated under the joint responsibility of the central and the state governments. The central government is responsible for procurement, storage, transportation, and bulk allocation of food grains while the state governments distribute the same to the consumers through the established network of Fair Price Shops (FPS). The allocation and identification of BPL/APL families, issuance of ration cards, supervision and monitoring the functioning of FPS's are done by the state governments. The items distributed under this scheme include wheat, sugar, pulses and kerosene.

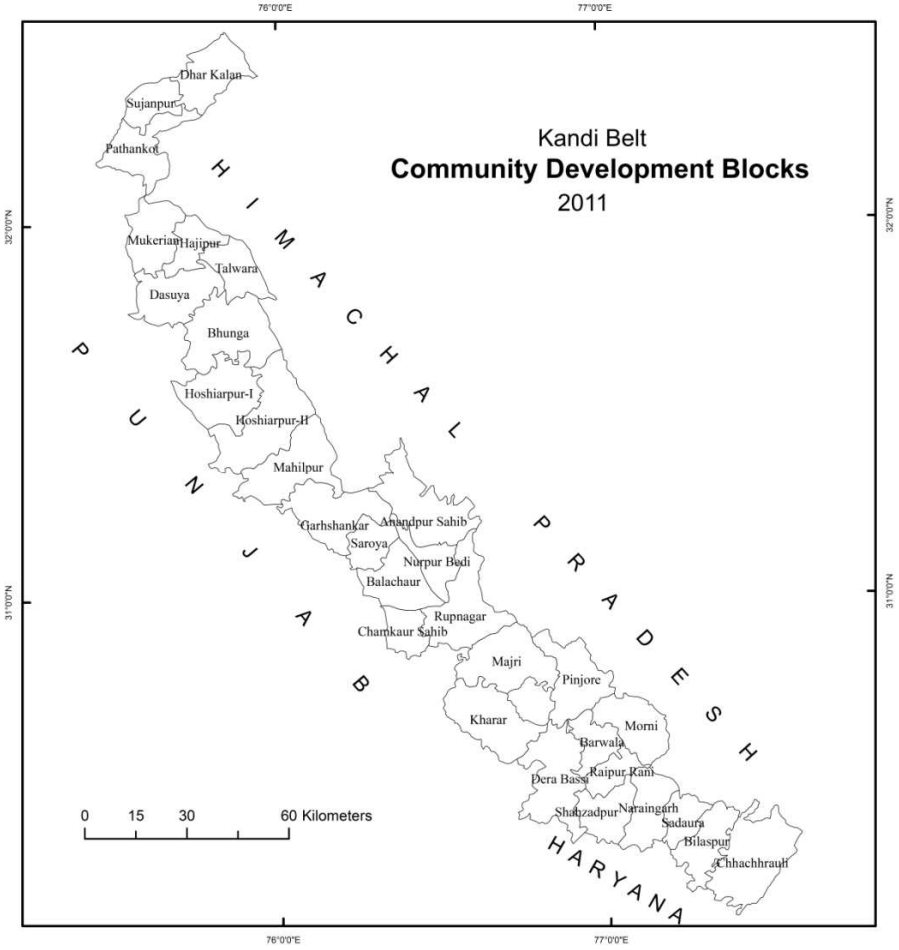
II. Objectives

The present research paper aims to study the functioning of Public Distribution System in ensuring household level food security in the hilly areas of Punjab and Haryana states. The perception and satisfaction level of the beneficiaries regarding the functioning of PDS have also been examined to understand the ground level situation.

III. Study area

The present study is conducted in the mountainous region of Punjab and Haryana States. This hilly region is also known as Kandi belt (Map 1). Generally, the areas falling at an elevation of more than 300m above mean sea level comprise the Kandi belt in both states. It includes all lands with the Shiwalik Hills together with a narrow strip of largely un-developed farmland in the foothills. The belt lies between the 30˚ 21′ 48″ to 36˚ 16′ 15″ North latitudes and 70˚45′ to 76˚56′ 54″ east longitudes.

Map 1



According to 2011 census, the population of the area is 48,35,343. Nearly one-third of total population belongs to schedule castes. Majority of the development blocks in the region have higher proportion of BPL population in comparison to the most other blocks of the respective states. The main source of livelihood in the area is mixed farming i.e. subsistence agriculture supplemented by livestock. Almost 33 percent of total workers are engaged in agriculture. Most of the farmers have small (1-2 ha) or marginal land holdings. High yielding varieties of seeds are rarely used by farmers; as the area is more suitable for forest vegetation rather than crop cultivation due to lack of irrigation facilities, undulating character of the terrain, and coarse textured soils. Cropping intensity is low as compared to Punjab and Haryana as in most of the area, single crop is grown. The fertilizer consumption per hectare is very less in this area; the farmers leave the fields fallow for few years to regain the fertility of the soil.

IV. Data and Methodology

This research work is based on both secondary and primary data sources. Secondary data related to Public Distribution System such as number and location of Fair Price Shops, number of beneficiaries, type of commodities were collected from Department of Food, Civil Supplies & Consumer Affairs of Punjab and Haryana states. For evaluating the access and perception dimension of beneficiaries, the primary data were collected through interview schedule. The schedule contained two parts. The first part covered the demographic, socio-economic profile of the beneficiaries and their opinion regarding the functioning of PDS. Questions related to quantity, quality and availability of commodities, behaviour of the owner of the Fair Price Shop (FPS) and overall experience of acquiring products from the FPS were asked from the sampled beneficiaries. The second part of the schedule covered questions to ascertain the perspective of the owners of Fair Price Shops about the system. The questions related to the timely allotment of commodities, support of higher authorities, attitude of the beneficiaries etc were asked from the FPS owner respondents.

The effectiveness of PDS was analyzed based on the responses obtained from 189 beneficiary households selected through stratified sampling procedure. The FPS owner from each sample village/ward was also interviewed. Further, tables, graphs and diagrams have been employed to present data for analysis. Distribution of Fair Price Shops as well as the beneficiaries has also been shown on maps prepared by using ArcGIS 9.3.

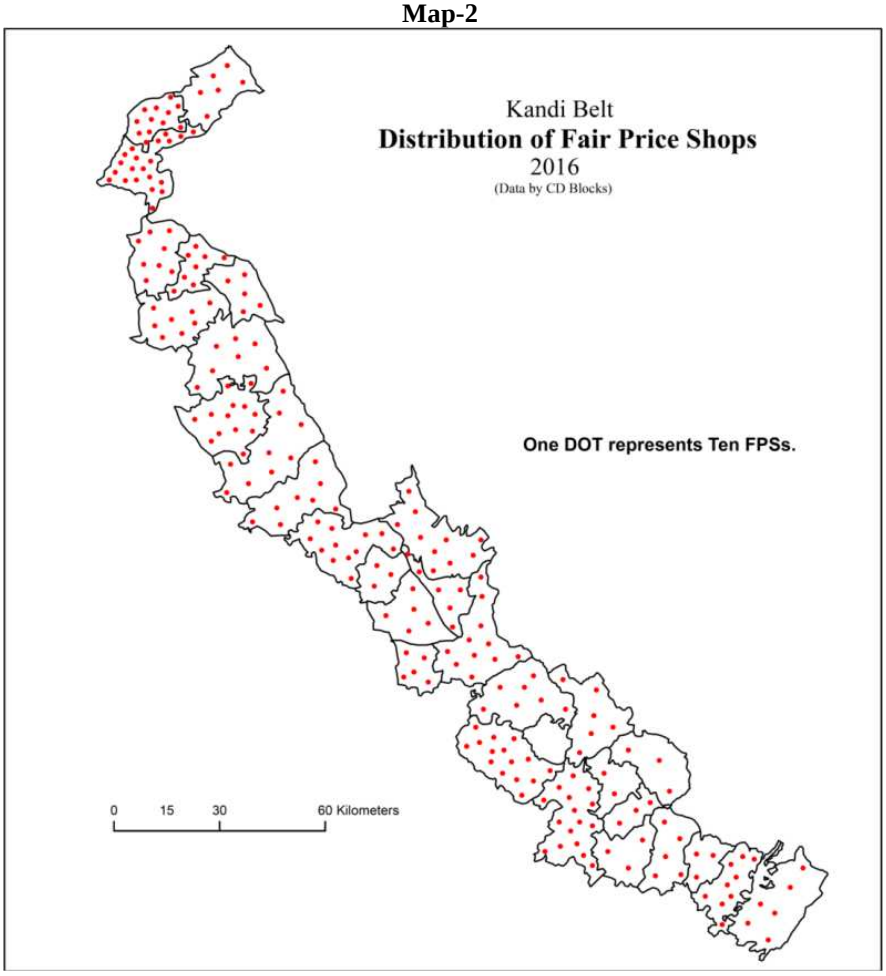
V. Results and Discussion

The results of the study have been discussed under two sections. In the first section, working of Public Distribution System in Kandi Belt has been discussed through secondary data while in section second, the effectiveness of PDS has been evaluated through the perception of beneficiaries. Problems faced by these beneficiaries have also been explained in this section.

i. Public Distribution System in Kandi Belt

In this belt, PDS works administratively in the similar way as it works in other parts of the Punjab and Haryana States. The Food & Civil Supplies Departments maintain a four-tier administrative set-up for PDS namely; state, district, block and sub-centre levels. Punjab State Civil Supplies Corporation (PSCSC) in Punjab and Haryana State Federation of Consumers Co-operative Stores Ltd (CONFED) in Haryana with a three-tier structure (head office, district and distribution centre) acts as the wholesale agent for lifting food grains from FCI godowns and stocks them at their district level wholesale points from where FPSs lift them on prepayment basis. The study area has a network of 2353 Fair Price Shops and their distribution is shown in Map 2.

Map-2



Source: Departments of Food, Civil Supplies and Consumer Affairs of Punjab and Haryana States.

It is clear from the map that the FPSs are very well distributed over the Shiwalik belt despite its hilly topography. Relatively higher concentration of these FPSs is found in the north covering Sujanpur, Pathankot and Hajipur blocks. Hoshiarpur-I and Garhshankar blocks in the centre and Kharar, Dera Bassi and Bilaspur in the southern part of the Kandi belt also have higher number of such shops.

Generally the number of FPSs depends on the number of card holders in a particular area. At present in the Shiwalik belt, there are nearly 5.7 lakh card holders who are taking benefits of the subsidised food under NFSA (Table 2). The proportion of beneficiary households varies from a maximum of 93 percent of total households in Nurpur Bedi block to a minimum of 33 percent in Pinjore block (Map 3).

Table-2
Shiwalik Belt: Distribution of Fair Price Shops and Card Holders by Blocks, 2016

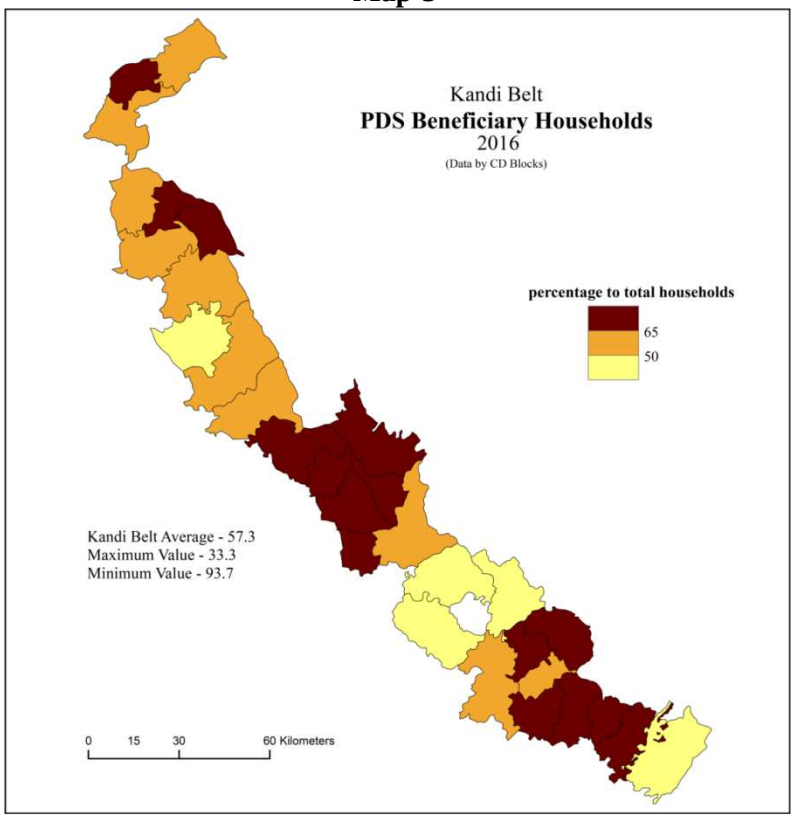
S. No.	Block	No. of FPS	No. of PH Cards	No. of AAY Cards	Total Cards	No. of Cards per FPS
1	Dhar Kalan	58	9675	428	10103	171
2	Sujanpur	117	16245	236	16481	141
3	Pathankot	213	34055	274	34329	161
4	Mukerian	78	18962	718	19680	252
5	Hajipur	81	11983	430	12413	153
6	Dasuya	77	16121	821	16942	220
7	Talwara	52	12658	1262	13920	268
8	Bhunga	65	16974	489	17463	269
9	Hoshiarpur-I	134	32766	609	33375	249
10	Hoshiarpur -II	92	19577	388	19965	217
11	Mahilpur	77	19905	809	20714	269
12	Garh Shankar	123	27892	1587	29479	240
13	Saroya	25	10620	139	10759	430
14	Balachaur	49	17089	222	17311	353
15	NurpurBedi	60	18450	274	18724	312
16	Anandpur Sahib	101	29458	365	29823	295
17	Rupnagar	111	22171	204	22375	202
18	Chamkaur Sahib	46	10405	98	10503	228
19	Majri	71	17766	190	17956	253
20	Kharar	145	37523	611	38134	263
21	Dera Bassi	164	41517	1498	43015	262
22	Pinjore	61	27496	1716	29212	479
23	Morni	29	2756	115	2871	99
24	Barwala	19	9238	306	9544	502
25	Raipur Rani	33	6439	537	6976	211
26	Shahzadpur	34	12,046	581	12627	371
27	Naraingarh	52	18921	680	19601	377
28	Sadaura	34	8656	215	8871	261
29	Bilaspur	93	18154	1051	19205	207
30	Chhachhrauli	59	12243	651	12894	219
	Kandi Belt	**2353**	**557761**	**17504**	**575265**	**244**

Source: Department of Food, Civil Supplies & Consumer Affairs, Punjab and Haryana States.

Nearly 50 percent blocks have more than two-third households as beneficiaries. These blocks make four isolated but contiguous pockets. The two large ones are respectively in the southern Shiwalik belt (which covers Morni, Barwala, Shahzadpur, Naraingarh, Sadaura and Bilaspur), and the central part of the study region (covering Garhshankar, Anandpur Sahib, NurpurBedi, Chamkaur Sahib, Saroya and Balachaur blocks). The remaining two small pockets lie in the northern and north-eastern part (Sujanpur, Hajipur and Talwara blocks). All these areas of high proportion of beneficiary households have

comparatively hilly terrain. Majority households have casual labour as their main occupation and hence dependence on PDS is more. However, some blocks of this category particularly Chamkaur Sahib, Naraingarh, Sadaura, Bilaspur do not have disadvantageous relief as they are adjoining the plains of Punjab and Haryana. The proportion of beneficiary population is ascribed to comparatively high proportion of Scheduled caste population residing there. As the PDS policy focuses on the marginalized sections of society, in blocks having high scheduled caste population, the number of beneficiaries is also more.

Map-3



Nearly 33 percent blocks have beneficiary households between 50 percent to 65 percent. Major blocks of this category form a continuous belt from north to central part of the belt with one small parcel falling in southern part over Dera Bassi and Raipur Rani blocks. Considerable number of these blocks also have uneven topography and high proportion of scheduled caste population. Low proportion of beneficiary households (less than 50 percent) is a feature of only areas falling around major urban centres such as Chandigarh and Hoshiarpur. Due to comparatively higher level of urbanization, the incidence of poverty is less and people of these areas have employment opportunities in nearby urban places.

The spatial distribution patterns of the FPS's and the beneficiaries of PDS as discussed above reveal the coverage of the programme in the study area. To look into its effectiveness, the population served per FPS has been calculated and a comparison has been made with the norms set by the state governments (Punjab and Haryana).

It has been noted that in this belt, one FPS on an average serves 244 households which is much below the norm of 600 households set by the government. This clearly means that people in this belt are well served by the scheme. The number of beneficiaries in the Punjab area is 254 (equal to state average) compared to 294 in Haryana part of the study region (Haryana state average is 310 card holders). That means, the mountainous blocks of Haryana are better served than the rest of the state in this regard, although they are behind the Punjab part of the region.

ii. Effectiveness of PDS – Respondents' Perceptions

In this part, an attempt has been made to see how the PDS has, as a policy intervention, been perceived by respondents. For this purpose the responses of 189 beneficiaries have been evaluated with a particular focus on quality, quantity and availability and regularity of PDS items, behaviour of the owners of the FPS and overall working of FPS. It is important to reiterate that most of the respondents belong to the marginalized sections of the society. Nearly 66 percent households belong to the scheduled castes followed by 23 percent to general caste and remaining 11 percent households to the backward and other backward castes. Almost 60 percent beneficiary households have casual labour as the primary source of occupation. Only 8 percent are involved in private jobs. During the survey, it has also been observed that nearly 10 percent households have been getting benefits from the PDS despite having government jobs. This points towards the loopholes in issuance of the ration cards. Scholars such as Jha et al. (2013), Kumar and Mohanty(2012) and Bhat and Hussain (2012) have also highlighted the corruption in the issuance of ration cards in their respective works. Thus, for the better efficiency of this programme, the procurement and distribution of cards should be transparent and user friendly (Ahluwalia, 1993).

Table-3
Kandi Belt: Sampled Households as per Ration card Types

Type of Ration Card	No. of Households	Percentage
AAY	27	14.3
BPL	78	41.3
Atta Dal (Blue Cards)	84	44.4
Total	189	100

Source: Calculated from Field Survey Data, 2016.

According to NFSA, although there are two types of beneficiaries; Priority Households and AAY, but during the field survey it has been noted that

the beneficiaries still possess old ration cards. Among the respondents, nearly 44.4 percent beneficiaries have Blue cards (Atta Dal) issued by the state government, 41.3 percent have BPL cards and only 14.3 have AAY cards (Table 3).

The Blue card holders are found only in Punjab part of the Kandi Belt as this policy was introduced by the Punjab state in 2007.

The effectiveness of PDS in providing food security to the people in the study area has been evaluated from respondents' perspective in terms of following major issues related with the system:

i. Availability and Quantity of PDS Commodities
ii. Quality of PDS Commodities
iii. Regularity in Purchase of PDS Commodities
iv. Location of Fair Price Shop
v. Source of Information about Arrival of PDS Commodities
vi. Awareness of Beneficiaries
vii. Behaviour of FPS Dealer
viii. Working of FPS

i. Source of Information about Arrival of PDS Commodities:

This is one of the important issues concerning the distribution of commodities among the beneficiaries. It is clearly stated in the PDS manual to inform the beneficiaries much before the distribution of PDS items. In the present case, only 28.6 percent households got this information directly from the fair price shop owners (Table 4). Nearly half (46 percent) of the households get information from their neighbours regarding the arrival of the foodgrains in the FPS. The remaining one-fourth households come to know about the arrival of commodities in the shop through other sources such as announcement through a public address system in a Gurudwara or Panchayat ghar. This shows that the half of the beneficiaries depend upon informal means and expressed their unhappiness with the system in this regard. Therefore, for the better efficiency of PDS, the FPS dealer should inform beneficiaries regularly.

Table-4
Sources of Information about Foodgrains Arrival in FPS

Source	No. of Respondents	Percentage
FPS Owner	54	28.6
Neighbour	86	45.5
Other	49	25.9
Total	189	100.0

Source: Calculated from Field Survey Data, 2016.

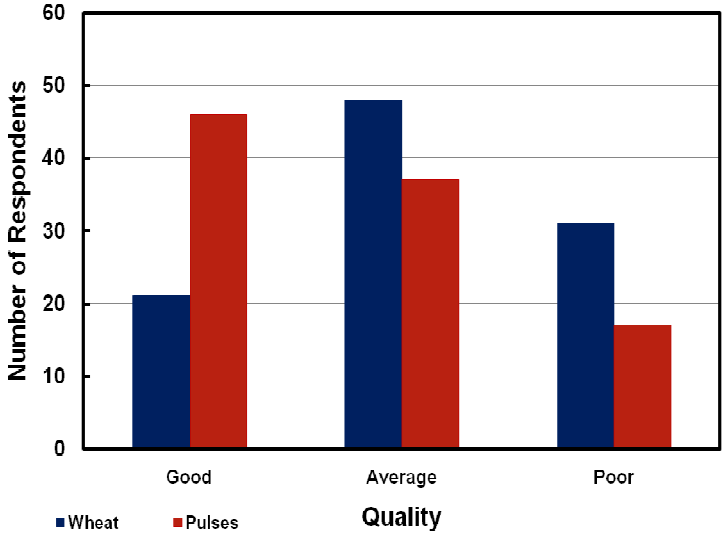
ii. Availability and Quantity of PDS Commodities

In the study area, wheat is the main commodity distributed under PDS. A large majority (86%) of respondents said that they get only wheat under PDS and other food items are not given to them. Thus, a large number of respondents are not satisfied as far as the availability of food items is concerned. All respondents remarked that commodities such as sugar, kerosene, and rice should be given on time. As per the PDS programme, each household is entitled to get 35 kg wheat (5 kg per person) and 2.5 kg pulses per month. However, in the surveyed households, the prescribed amount is not given to beneficiaries. Half of the beneficiaries reported that they receive wheat 4 kg per head per month and sometimes the quantity is below 4 kg and is not sufficient for meeting their needs. Nearly 10 percent of the surveyed households borrow ration cards to buy wheat from the fair price shops. Forty two percent of the households buy foodgrains from the market, while 27 percent households borrow either from neighbours or from friends and relatives. Therefore, the PDS is not fulfilling the needs of a large majority of poor households in terms of quantity of foodgrains in the Kandi belt.

iii. Quality of PDS Commodities

Beneficiaries were asked about the quality of food items received from FPS. As far as the quality of wheat distributed is concerned, nearly 21 percent households termed it as good while 48 percent and 21 percent of the households termed it as average and poor respectively (Fig. 1).

Fig.-1
Quality of Foodgrains



Source of Data: Computed from Field Survey, 2016.

In case of pulses, almost 46 percent beneficiaries responded that the quality of pulses is good as it is provided in sealed packets. But nearly 37 percent used the term average for the quality of pulses and the rest (17%) defined it poor. Sometimes they received the open packets of pulses instead of sealed ones and hence these were lower in quantity. The FPS owners responded to this complaint by saying that they distribute whatever quality they receive from the godowns. On the whole therefore, 83 percent beneficiary households reported good to average quality of pulses while 69 percent reported the same in case of wheat. Ramaswamy and Balakrishnan (2002) studied the relationship between the quality of FPS products and switch over to open market and explained that poor quality of foodgrains has resulted into less dependency on PDS commodities and more on open market. The results of the present study support his findings and recommends that there is a great need of improvement in quality aspect of foodgrains distributed under PDS.

iv. Regularity in Purchase of PDS Commodities

Whether the beneficiaries buy the needed commodities from the PDS or not is another important dimension of the role of PDS in ensuring food security. Regularity in purchase by the people is related with their requirement and sometimes with their affordability. In the study area, nearly 36 percent (68) of the total households reported that they purchase regularly from the fair price shop, while rest of the beneficiaries occasionally purchase items from FPS (Table 5).

Table-5
Monthly Purchase of Foodgrains from FPS

Monthly purchase foodgrains	No. of Respondents
Yes	68
No	121

Source: Calculated from Field Survey Data, 2016.

Many reasons have been reported by the households for irregular purchase from FPS. These include irregularity in distribution, poor quality of commodities, old stocks etc. Almost 66 percent households blamed the irregular distribution by the FPS which discourages them from purchasing from it. On the other hand 27 percent households responded that due to poor quality of PDS foodgrains they did not like to purchase it from FPS. While 5 percent of the households reported that they do not get information regarding the arrival of foodgrains in the FPS and hence they fail to buy. Only 2 percent households believe that old stock is distributed and they avoid purchasing on regular basis (Table 6). In the opinion of the owner of FPS, they are not getting rations from godowns on time which results into irregular distribution.

Table-6
Reasons for Irregular Purchase of Foodgrains from FPS

Reasons for Irregular Purchase	Respondents (percent)
Irregular distribution by Dealer	66
Poor Quality	27
Lack of information on the availability of commodities	5
Supply of Old stock	2

Source: Calculated from Field Survey Data, 2016.

In addition to above, about 39 percent respondents reported that they do not get their grains at their first visit. They have to visit the FPS twice or thrice to buy the stocks, as many a time they found the shop closed and sometimes the dealer tells them about unavailability of required commodities. A large proportion also reported crowdedness as the reason of irregularity in buying the commodities(Table 7).

Table-7
Reasons for Repeated Visits in FPS

Reasons for Repeated visits	Respondents (percent)
Too much crowd	54
FPS does not have required items	22
To purchase in instalments	16
FPS is closed	8

Source: Calculated from Field Survey Data, 2016.

iv. Location of FPS

As far as the location of FPS is concerned, there are only 23 FPSs (out of 38) in sampled units and the beneficiaries of remaining 15 sampled units visit FPSs of nearby villages for the ration (Map 4).

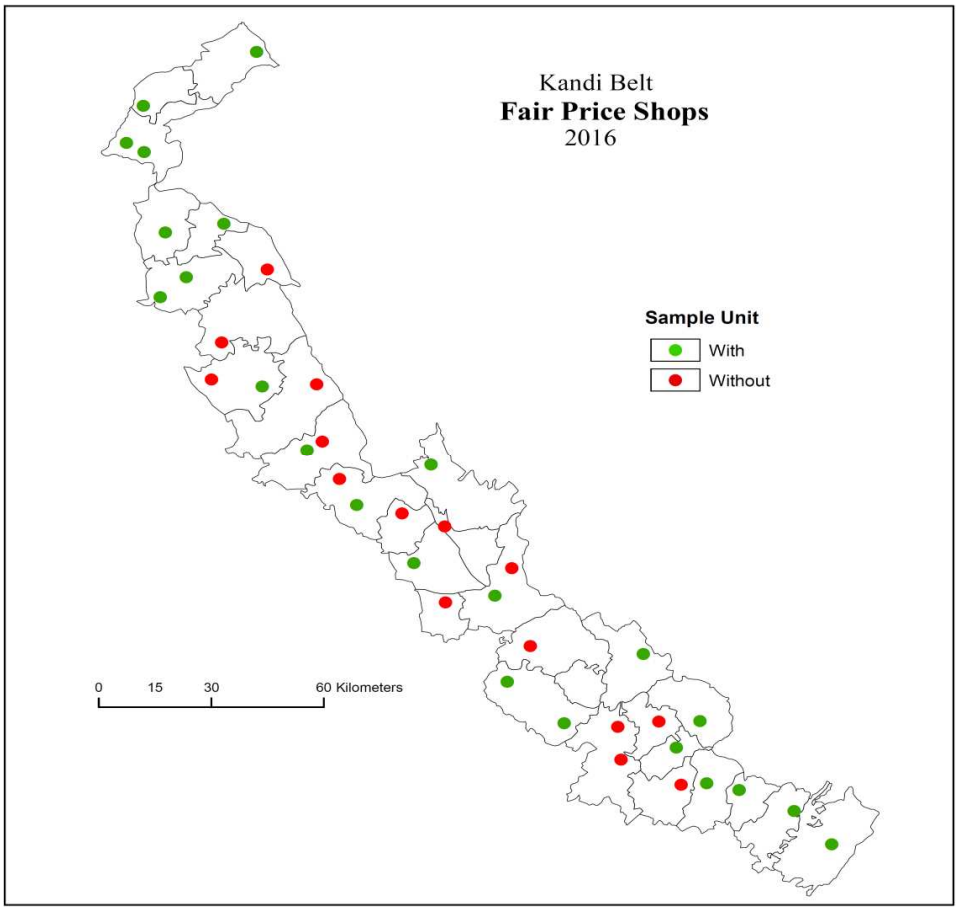
Almost 57.7 percent (109 out of 189) of the beneficiaries travel less than 2 km to get the services. While 7.4 percent card holders have to travel between 2 to 4 km and 6.9 percent (13) travel between 4 to 6 km to obtain the PDS services from the fair price shops (Table 8). Almost one fifth of the beneficiaries travel a distance of more than 6 km. Some respondents remarked that the location of FPS is not fixed and every time they have to visit a new place. As a whole, location of FPS is not much of a problem for the respondents.

Table-8
Distance of Fair Price Shop

Distance (km)	No Respondents	Percent
0-2	109	57.7
2-4	14	7.4
4-6	13	6.9
Above 6	38	20.1
Not Fixed (Mobile)	15	7.9

Source: Calculated from Field Survey Data, 2016.

Map-4



v. Awareness of Beneficiaries

For the success of any welfare programme, community awareness is the principal factor. Due to lack of awareness about the entitlement to receive service/goods quantity and price, the possibility of manipulation by the FPS owner is much more (Naik, 2009). In the present study, almost 45 percent have been found to be having knowledge about the exact quantity of the commodities prescribed by the government to each ration card. As regards the price of each commodity they are getting under PDS, 41.2 percent respondents knew about same (Table 9). The awareness of the beneficiaries depends on their education level especially the education of household head. In the sampled beneficiary households one third of the household heads are illiterate. Therefore, for enhancing effectiveness of the PDS, actions should be taken to increase general awareness among the people.

Table-9
Awareness level of Beneficiaries

Awareness Level	No. of Respondents	Percentage
Quantity	85	45.0
Price	78	41.2

Source: Calculated from Field Survey Data, 2016.

vi. Behaviour of FPS owner

The beneficiaries were also asked about the behaviour of FPS staff. Nearly 37 percent respondents considered their behaviour friendly while another 33 percent considered them rude. The remaining 30 percent gave no opinion regarding the behaviour of the FPS staff. Some of them suggested that the dealership of the shops should be renewed every year.

vii. Working of FPS

A large number of respondents (47%) are not satisfied with the working of FPS in their villages (Table 10). Nearly one third reported that they are satisfied with it, while the remaining 22 percent did not give any opinion regarding this.

Table-10
Working of FPS

Working of FPS	Respondents (percent)
Satisfactory	31
Not Satisfactory	47
No Opinion	22

Source: Calculated from Field Survey Data, 2016

Respondents gave various reasons for their non satisfaction. They reported that the ration cards have not been updated since a long time. Among these card holders, the BPL households have owned the ration cards for more than 10 years and some have for more than 20 years. Almost 60 percent of AAY households also possessed it for more than a decade. As Atta Dal scheme was introduced by the Punjab Government (2007), households are possessing Blue cards since 2007. Nearly 60 percent respondents complained about the timings of FPS. The FPS owners did not open it on time. The information regarding the arrival of stock, price of commodity, complaint number etc is also not displayed on notice board in the FPSs. Nearly 40 percent beneficiaries reported about the incorrect weight, measures and manipulation of entries in the register.

As a whole, in the opinion of the beneficiaries, the food subsidies are very useful for their households. About 90 percent respondents mentioned that

the ration should be provided regularly and more food items should be included under this scheme. Besides this, in order to ensure food security for one and all, the amount of grains procured from PDS needs to be increased significantly. Around 40 percent respondents also mentioned that every village should have a FPS. The respondents have also been supported by the FPS owners as they also mentioned that the PDS working will be more efficient if it is located within each village.

VI. Conclusion and Policy Implications

Like any other area, in the kandi belt also, the Public Distribution System covers largest proportion of the needy population. It functions with the help of FPSs which are fairly spread in all parts of this belt. At the regional level, the proportion of beneficiaries is more in central and southern part of the belt and their concentration is comparatively less in areas located adjacent to the Chandigarh city. The results highlight that the FPSs are located in all parts of the belt. Their distribution is fairly dense in blocks having comparatively hilly topography. Topography therefore, does not affect the operations of PDS. The number of FPSs rather depends on the number of card holders in the area. This region, being low on its own production due to unfavourable conditions is well served by the PDS.

However, the analysis of primary data highlighted that the PDS at ground level is suffering from many problems. Problems such as non-availability of food grains, unsatisfactory quality and quantity of commodities, incorrect weights and measures, rude behaviour of FPS owners and unfair distribution of food grains are faced by beneficiaries. It has also been found that the non-availability of food grains is due to various reasons like storage and transport problems, irregular supply from government, black marketing and lack of government supervision and control. Even when the ration is available, it is of poor quality.

Therefore, in order to make this food programme successful, reforms are required. Transparency in allotment of ration cards should be given priority as a large proportion of the needed people still have not been covered under this scheme. Ration cards should be linked with Aadhaar cards. The FPS should be opened in every village and its infrastructure should be improved. Rigorous steps should be taken to tackle the problem of corruption at each stage of this programme. Electronic Cash Register and computerisation at FPS is needed which will enhance the transparency of the system. Regular monitoring and supervision of FPS by the higher authorities is strongly recommended. For implementing PDS more efficiently at the micro level, the Chhattisgarh PDS Model should be followed. Only after the improvements in problems faced by beneficiaries, the PDS can achieve its avowed objective and helps in eradication of poverty and hunger.

References

Ahluwalia, D. (1993). Public distribution of food in India: Coverage, targeting and leakages. *Food Policy*, *18*(1), 33-54.

Bhat G. M. & Hussain, B.A. (2012). Efficiency of Public Distribution System in Kashmir: A Micro Economic Analysis. *International Research Journal of Social Sciences,1*(4), 24-27.

Bhatia, B.M (1985). *Food Security in South Asia.* New Delhi: Oxford and IBH Publishing Co.

Chander, S., Vermani, S., & Kumar, A. (2017). Role of public distribution system in providing food security in India. *Indian Journal of Health and Wellbeing*, *8*(4), 322.

Government of India (2013). National food security act. *The Gazette of India.* Retrieved from http://indiacode.nic.in/acts-in-pdf/202013.pdf on April 5th, 2016.

Government of India. *Ninth five year plan (1997-2002).* Retrieved on March 10th, 2017 from http://planningcommission.nic.in/plans/planrel/fiveyr/welcome.html.

Jha, R., Gaiha, R., Pandey, M. K., & Kaicker, N. (2013). Food subsidy, income transfer and the poor: A comparative analysis of the public distribution system in India's states. *Journal of Policy Modeling*, *35*(6), 887-908.

Joshi, P.K. (2016). Pathways to Improve Food Security and Reduce Poverty in Emerging India. *Agricultural Economics Research Review*, *29*, 171–182.

Kishore, A. & Chakrabarti, S. (2015). Is More Inclusive More Effective? The 'New Style' Public Distribution System in India. *Food Policy*, *55*, 117–130.

Kumar, A. & Ayyappan, S. (2014). Food Security and Public Distribution System in India. *Agricultural Research*, *3*, 271–277.

Kumar, A., Parappurathu, S., Bantilan, M. C. S., & Joshi, P. K. (2015). Public Distribution System in India: Implications for poverty and food security. *International Food Policy Research Institute, New Delhi, accessed through http://vdsa.icrisat. ac. in/Include/MiniSymposium/12. pdf*.

Kumar, B. & Mohanty, B. (2012). Public Distribution System in Rural India: Implications for Food Safety and Consumer Protection. *Procedia Social and Behavioral Sciences*, *65*, 232-238.

Naik, I. (2009). Problems of Public Distribution System: A Case Study of Kashipur Block in Orissa.*Indian Anthropologist, 39 (*1&2), 145-153.

Ramaswami, B. and Balakrishnan, P. (2002). Food prices and the efficiency of public interventions: The case of the public distribution system in India. *Food Policy,27*(5&6), 419-36.

Sandhu, A. (2014). National Food Security Act, 2013 and Food Security Outcomes in India. *Vision*, 18, 365–370.

Svedberg, P. (2012). Reforming or replacing the public distribution system with cash transfers?. *Economic and Political Weekly*, 53-62.

Tanksale, A.; Jha, J.K. (2015). Implementing National Food Security Act in India: Issues and challenges. *Br. Food J*., 117, 1315–1335.

Varadharajan, K.S.; Thomas, T.; Kurpad, A. (2014). The Indian National Food Security Act, 2013: A commentary. *Food Nutr. Bull*., 35, 253–265.

Man & Development
Vol. XLIII No. 4, December 2021,
http://www.crrid.res.in/journal/
ISSN 0258-0438

GROWTH OF MSMES IN INDIA AND ASSAM: A TREND ANALYSIS

Rubab Fatema Nomani[1] and Alok Sen[2]

Abstract: In this study, the trend in growth of four variables viz., no of enterprises (working), production, investment and employment in MSMEs of India and Assam during a fifteen year period viz. 2000-01 to 2015-16 is analyzed with the help of four mathematical curves. Instability in the two data series is examined and compared with the help of Cuddy's Instability Index. The study finds the cubic form of model to best describe trend in growth of almost all four variables for both India and Assam. This means that the growth path for almost all the variables is not smooth or regular. Both at the initial and later stages, growth takes place at slower rates. The variability/instability in growth in all four variables has implications for planning. It means that growth cannot be expected to follow a regular pattern. More efforts have to be put in the beginning, and only after a certain critical minimum effort, do substantial gains take place.

Keywords: MSMEs, Trend Analysis, Instability Analysis, Mathematical Curves

1. Introduction

Small scale industries (SSIs) are the backbone of the Indian Economy, with a robust contribution to the GDP, total manufactured output, employment and exports. The erstwhile SSI sector has been renamed as the Micro, Small and Medium (MSME) sector with the enactment of the path breaking MSMED Act, 2006. It is estimated that the MSMEs in the Indian economy accounts for about 30 percent of Gross Domestic Product, 32 percent of Gross value Added (GVA), and 45 percent of total exports of the country. As the second largest employer (after agriculture), this sector engages about 111 million people in over 63 million units spread across the country. Also, these enterprises offer a wide spectrum (over 6000) of products for mass consumption. The GVA in this sector is

[1] Associate Professor, Department of Economics, DHSK College, Dibrugarh Assam, India.
Email: rubabnomani@yahoo.co.in

[2] Professor, Department of Economics, Assam University, Assam India.
Email: alok_sendr@yahoo.com

growing consistently at around 11 percent annually in recent years, which is more than the GDP growth rate (Annual Report 2018-19, Ministry of MSME, Govt. of India). Experience of the last two decades clearly exhibits that the MSME sector has not only survived competition but also, the growth rate of production in this sector has been consistently higher than that of overall industrial sector. This demonstrates the high degree of resilience and adaptability of this sector.

This sector has been assigned a crucial role in the various 5 year plans of India, and is an integral part of its Development/ Industrial Strategies and Policies. The first Industrial Policy Resolution of 1948, and later the Industrial Policy Statement 1977 and 1980, reiterated that thrust should be laid on the effective promotion and development of SSIs. The Eleventh Five Year Plan documents, "MSMEs are more than just GDP earners; they are instruments of inclusive growth which touch upon the lives of the most vulnerable, the most marginalized people. Yet this sector in successive five year plans has not received its due" (Patel, 2010).

The MSMED Act, 2006 adopted new concepts and definitions as in Table 11(a) and placed the entire non-farm sector under a separate Ministry. It may be noted that all data prior to 2006 are related to the SSIs and subsequent data is related to the MSMEs. In May, 2020,fe the Government of India announced further changes in the definition and criteria of the MSMEs, substantially enhancing the investment limits in all tiers - Micro, Small and Medium, and introduced for the first time the new or additional criteria of annual turnover as in Table 11(b).

2. Rationale & Importance of the Study

MSME sector has evoked a great deal of interest among policy makers and researchers alike in recent years, because of their critical role in generating mass employment, employing local resources and indigenous knowledge, empowering women, and widening the industrial base; thereby promoting inclusive growth, particularly in the regional economies of India.

The North East of India is a region that is abundant in natural and human resources, and a storehouse of rare indigenous knowledge and rich culture and traditions. Despite all its potentialities, development in this region remains largely elusive and growth of all industries - Large, Medium and Small, is tardy and lop sided. The state of Assam is the gateway to the North East and is industrially and economically the most developed state of the region. Yet, when we compare its performances with other states of India, Assam occupies rock bottom positions on most economic development and human development indicators. Although Assam has a long history of industrialization, yet it failed to tap the advantages and opportunities offered by changing times, and the industrial sector remains largely concentrated around a few traditional large scale industries like tea, oil and natural gas. Ancillary industries failed to grow around these industries, and

the huge natural and human resources of the state remains untapped and under utilized. The MSME sector is in its nascent stage in this region as well as in the state of Assam, with little diversification, innovation or modernization.

The critical role of small industries in promoting growth in the regional economies of India cannot be over emphasized. But to facilitate this, we need proper planning and conducive policies that are backed by scientific data and analysis. It is in this backdrop that the present study has been undertaken. The broad objective of the study is to facilitate the understanding of long term tendencies of the data sets relating to the growth variables viz. number of enterprises, employment, production, investment in MSMEs in India and the leading state of the North -East, Assam .This may be expected to guide in manpower planning, choice of technique and the efficient management and distribution of scarce resources in backward regions like the North-East and formulation of suitable policies for balanced regional development.

3. Literature Review and Research Gap

Although there are many studies on different aspects of growth pattern and productivity performance of the manufacturing sector in general, at the macro level in India; such studies on the small scale industrial sector is limited. Also there are very few studies on the trend of growth in the MSME sector. Below, we undertake a brief review of some important studies.

Most of these studies took note of the fact that the growth in industrial employment lagged behind the growth of industrial investment and output. Thus they took exception to the role of .small scale industries as purveyors of employment.

In a study on industrialisation in Orissa, Vyasulu and Kumar (1997), using ASI data on manufacturing sector of the state during 1966-67 to 1988-89, employed different functional forms to capture trends in four variables viz., number of factories, number of employees, fixed capital and gross value added. The industry group-wise and district-wise analysis with regard to the four variables showed different growth curves among linear, log linear, quadratic, log quadratic curves to be appropriate in each case.

In their study of growth performance of small scale industries of West Bengal, Mukherjee et al. (1999) obtained growth rates of number of units and employment for each district of the state from secondary data, by fitting trend curves and by averaging year to year growth rates for 25 years. They found considerable inter-district variations. However, there was not much difference in year to year growth rates in individual districts.

Chakraborty (2005) in his study of the paper industry of Assam based on secondary data, estimated trend in growth of output with the help of four mathematical curves viz., simple linear, quadratic, third degree parabola, and

exponential curves. He further examined instability in the data set by applying the Instability Index developed by Cuddy et.al (1978). The results suggested that the cubic form of model was most appropriate for the study of trend of the time-series on output of the industries studied.

In a study on the performance of micro and small enterprises in Tamilnadu for the sixteen year period of 1991-92 to 2007-08, based on secondary data, Sivalingam et al. (2008) applied the regression model to estimate growth rates. The results based on the trend line showed a positive and good annual average increase in all the indicators studied viz. number of units, fixed investment, employment and production in the state. However, certain sectors like textile, leather and automobile were facing stiff competition from both domestic and international market. Policy interventions In terms of infrastructural support, direct catalytic subsidy, technical, information and marketing support were the pressing needs of the hour for the state, they concluded.

The effects of globalization on Micro, Small and Medium Enterprises (MSMEs) in India was studied by Sonia and Kansai Rajeev (2009) **.** They used secondary data on the four performance indicators viz. number of MSME units, production, employment and export during 1973-74 to 2008-09 , covering the pre and post liberalization period, to calculate the Annual Average Growth Rate (AAGR) It was found that the . AAGR was higher in all the four parameters in the pre-liberalization period (1973-74 to 1989-90) than in the post liberalization period (1991-92 to 2007-08). They concluded that, contrary to expectations, there was no improvement in the performance of MSMEs in the post-reform period in India. Bargal et al. (2009) employed similar methods and arrived at the same conclusions

Gupta (2009) presented an empirical assessment of the future prospects of small scale industrial sector of Punjab by using Auto Regressive Integrated Moving Average (ARIMA) model through Box-Jenkins. He forecasted a bright future of small industrial sector of Punjab but warned that growth in the number of units and employment would probably be slower than that of investment and production. The author called for drastic changes in the industrial policy of Punjab and pressed for a package of incentives not only for existing industries but also for new ventures.

Bargal et al. (2009) tried to evaluate the performance of the small scale industries at the all- India level, using secondary data. They estimated the AAGR and CAGR for four parameters viz., employment, number of units, exports and productivity, in the pre and post reforms period separately. It was concluded that no significant change had taken place in the performance of the small scale enterprises in the post reforms period despite the numerous supporting schemes and policies of the government.

Kumar (2010) tried to ascertain the growth pattern and productivity trends in small scale rubber and plastic products industry of Punjab based on 25 years secondary data. He estimated the average annual growth rates (AAGR) and compound annual growth rates (CAGR) of four variables viz., production, employment, investment and number of units. It was found that while in the overall period studied, there was significant growth in all the variables; there was sluggish growth in employment and number of units in the post economic reforms period. However, productivity of both labour and capital had increased in the post reforms period.

The literature survey as outlined above reveals that there have been only a few attempts at applying the technique of mathematical curve fitting to depict trends of growth in the industrial sector in general, and the MSME sector in particular. Such studies on the MSME sector in Assam is conspicuous by its absence.

4. Data and Methodology

Various statistical/mathematical techniques may be employed to interpret time-series data sets. In this study, the trend in growth of the four variables viz. number of enterprises, investment, employment and production is analyzed with the help of mathematical curves.

Curve fitting is the process of constructing a curve or mathematical function that has the best fit to a series of data points, possibly subject to constraints. These curves have a descriptive as well as predictive purpose.

Curve fitting tends to be arbitrary as different forms of functions may be employed, which may range from simple to very complex functions.

The most popular and widely used method of fitting mathematical function to a given data set is the OLS or ordinary least squares method. In case of time series data, the variables under study are expressed as a function of time. In our study, at first, the data on production and investment (monetary data) have been expressed in terms of constant prices (base year 2011-12). Subsequently, the data corresponding to the four variables viz., number of enterprises, employment, investment and production is fitted to four different mathematical curves, viz., Simple linear curve, Second degree parabola or Quadratic curve, Third degree polynomial or Cubic curve and Exponential curve.

Simple linear : $Y_t = \beta_0 + \beta_1 t + \mu_t$. ------(i)

Second degree parabola or Quadratic curve : $Y_t = \beta_0 + \beta_1 t + \beta_2 t^2 + \mu_t$.-- (ii)

Third degree polynomial or Cubic curve : $Y_t = \beta_0 + \beta_1 t + \beta_2 t^2 + \beta_3 t^3 + \mu_t$.-- (iii)

Exponential curve : $Y_t = \beta_0 \beta_1^t \mu_t$. ------- (iv)

Or

$\ln Y_t = \ln\beta_0 + t.\ln\beta_1 + \ln\mu_t$. …….(iv)′

where Y denotes dependent variable for which growth rate is estimated viz., no of enterprises/ employment/ investment/ production; t is time period in years, β_0 is intercept term, β_1's, β_2's, β_3's are coefficients of trend values; μ_t is error term.

The study adjudges the models for their suitability to the given data-set through accuracy estimates like R^2, adjusted R^2, t and F values. Further, in order to test variability in the two series, we employ a widely used Instability Index (I_i) developed by Cuddy et al.(1978). The I_i is useful to compare two or more time series and determine which is more stable. The coefficient of variation (CV) is the most commonly used measure of instability. However it has some limitations. The I_i is a better measure than CV as it is inherently adjusted for trend. The CV is computed using the following formula

C.V. = (Standard Deviation/Mean) x100.

Since the I_i computes the degree of variations around the trend, rather than around the mean, the CV is multiplied by square root of the difference between unity and adjusted coefficient of multiple determinations $(\overline{R}^2)$ to obtain the Instability Index. The original formulation of the I_i is

$I_i = (SEE/ \overline{Y}) x100,$

Where SEE is standard error of the trend line estimates, $\overline{Y}$ is average value of the time series data.

It can be reduced to the following form

$I_i = CV\sqrt{(1 - \overline{R}^2)}.$

In this study, Instability Index has been calculated for the different trend equations, and the equation showing least value of I_i is considered to be the best model for each of the four variables separately in case of India and Assam. The instability index is an ideal measure of goodness of fit of the model. Smaller the value of the index greater is the goodness of fit of the model.

It is noted that time series data for the MSME sector in particular, is difficult to find. The most reliable and continuous data on manufacturing industries in India is to be found in the Annual Survey of Industries .But this source does not publish data for small scale manufacturing industries separately. Notwithstanding the limitations, this study makes use of whatever annual time series data relating to the four variables viz. number of enterprises, production/output, employment and investment for India and Assam are available in the various editions of Annual Report of MSMEs, GoI and Economic Survey Reports of Assam. The production data relates to 2000-01 to 2012-13 for India and 2000-01 to 2010-11 for Assam, as subsequent data on production is not available in the above reports or other comparable sources. The data on number of enterprises and employment for India is from 2000-01 to 2015-16, and for

investment in India is from 2000-01 to 2014-15. Data on number of enterprises, employment and investment for Assam is from 2000-01 to 2015-16. {See Tables 12 (a) and 12 (b)}.

It may be stated that Production/Output(O) in the secondary data has been measured in terms of total money value of production in current prices. Labour(L) is measured in terms of number of employees or workers. Capital(K) refers to fixed investment measured in monetary terms. The authors have expressed the data on total production and fixed investment in India and Assam in terms of constant prices (base year 2011-12), using suitable deflators. The all India wholesale price index of manufactured commodities has been used to deflate gross output /production for both India and Assam, as state level deflators were not found. Likewise, the all India wholesale price index of machines and tools has been used for deflating the fixed investment figures for both India and Assam. Since the given time series data for every year is cumulative data; for deflation, we have taken non-cumulative data by subtracting previous year's data from current year's data. After deflation, we again cumulated the data and all further calculations were done based on this data. Thus the influence of the data of all previous years prior to our study period is eliminated.

6. Results and Discussion

Trend in the growth of number of enterprises, employment, investment and production during the study period is being examined for India and Assam separately with the help of four models viz., simple linear, quadratic, cubic and exponential. The coefficients of determination R^2, F scores and instability index have been estimated for each of the models for all four variables and presented in tables 1 to 4 for India and 5 to 8 for Assam in the Appendix. The best fit curve in each case is plotted graphically and presented in the form of figures 1-8.

It is observed from table 1 that most of the t scores for the regression coefficients of the different models are statistically significant. Also the F scores in each case are found to be statistically significant implying the overall goodness of fit of the models. However, the R^2 and the adj. R^2 are highest and correspondingly I_i is lowest in case of the cubic model. Thus variability is least in the cubic model and it may be considered to be the most appropriate model depicting trend in growth of number of enterprises in India.

From the graphical plot of the cubic form of model for number of enterprises in India as depicted in figure 1, it is seen that the cubic curve increases at an accelerated rate from 2002-03 up to 2009-10, after which it increases at a decelerated rate. Except for two outliers in 2005-06 and 2006-07, the curve fits the rest of the data points fairly well.

Table 2 relating to employment in India reveals that majority of the t-scores of the regression coefficients are statistically significant and so are the F values of all the models. The R^2 and adj. R^2 however are found to be highest, and

the I_i to be the lowest in case of the cubic equation. It is seen in Figure 2 that the cubic curve of the data on employment for India, increases at an accelerated rate from 2003-04 up to 2009-10, after which it increases at a decelerated rate. Other than the two outliers in 2005-06 and 2006-07, the cubic curve well fits the data points.

It is noted from Table 3 relating to investment in India that majority of the t-scores are statistically significant, along with highly significant F-values for all the models. But R^2 and adj. R^2 are highest and I_i is lowest in the cubic equation. It is seen in Figure 3 that the cubic curve of the data on investment for India, increases at an accelerated rate from 2003-04 up to 2009-10, after which it increases at a decelerated rate. Other than the two outliers in 2005-06 and 2006-07, the cubic curve well fits the data points.

With regard to production in India, it is surmised from Table 4 that majority of the t-scores as well as all the F-scores are statistically significant. The R^2 and adj. R^2 are highest and expectedly, the I_i is lowest in the cubic equation. It is seen in Figure 4 that the cubic curve of the data on production for India, increases at an accelerated rate from 2003-04 up to 2008-9, after which it increases at a decelerated rate. Other than the two outliers in 2005-06 and 2006-07, the cubic curve well fits the data points.

From Table 5 it is observed that all the t-scores for the regression coefficients for each model are statistically significant. The F scores are also found to be statistically significant in all the four models. However, the R^2 and adj R^2 are highest and I_i is the lowest in case of the cubic model. Thus it may be considered to be the most appropriate model for the data set. There are no outliers in the observed data relating to number of enterprises of Assam as depicted by Figure 5. The cubic curve fits the data almost perfectly.

It is observed from Table 6 that all but one of the t-scores for the regression coefficients are statistically significant out of the four models. The F scores are also found to be statistically significant in all the models. However, R^2 and adj. R^2 are highest and correspondingly, I_i is lowest in case of the exponential model which may be considered to be the most appropriate model depicting trend in growth of employment in Assam. In Figure 6, the exponential curve increases at a slower rate till 2012-13, after which it increases exponentially. Except for outliers at time point 2012-13 and 2013-14, the curve fits the data very well.

Table 7 relating to the investment in MSMEs of Assam reveals that the t scores of all but one of the coefficients are statistically significant. The F scores are also found to be statistically significant for all four models. However, R^2 and adj. R^2 are highest and the I_i is significantly low for the cubic equation as compared to the other three forms of trend equations. Thus it may be considered to be the most appropriate model in case of investment in Assam. It is clear from Figure 7 that there are no outliers in the original data, the cubic curve for

investment increases at an accelerated rate after 2004-05, and the curve fits the data almost perfectly.

Table 8, relating to production in MSMEs in Assam depicts that almost all the t scores of regression coefficients are statistically significant. The same is true of F scores in all the models. Further examination shows that the R^2 and adj.R^2 are equal to 1 and hence I_i equal to zero for the cubic equation. The graphical plot of the cubic form of model is depicted by Figure 8. There are no outliers and the data follows a smooth path.

Thus it may be deciphered from Table 9 that the cubic form of model is the best for the study of trend in number of enterprises, employment, investment and production in case of India, while for Assam, the cubic form best describes trend in growth of number of enterprises, investment and production whereas the exponential model best fits the data for employment. Chakraborty (2005) in his study of the paper industry of Assam, found the cubic form of model to be the most appropriate for the study of trend of the time-series on output of the industries.

With regard to variability of the series, Table 10 depicts that among the four variables, the data relating to production is the most stable in case of India as well as Assam. However the instability in all the series is much higher for India than Assam.

7. Conclusions and policy implications

From the trend analysis, it is concluded that the cubic form of model best describes trend in the growth of all four variables viz., number of enterprises, employment, investment and production for both India and Assam, except for the employment data of Assam, which is best depicted by the exponential model. This means for our study that the growth path for almost all the variables is not smooth or regular. Both at the initial stage and later stage, growth takes place at slower rates, which is generally true of economic phenomenon. After initial growth at slower rate, there is an accelerated growth path which continues till it reaches a maximum point, from where growth continues, but at nominal or zero rate, which may be called the saturation level of that variable or phenomenon. This may be due to rigidities of scale with respect to some uncovered factors or due to environmental or structural factors. This is particularly true of the all India series in our study, whereby it may be said that the saturation levels have been reached in case of all four variables. In the case of Assam, it may be surmised that this level is yet to be reached as all the variables are found to be in the accelerated growth path.

The variability/instability in all the series is much higher for India than for Assam. This is discerned from a glance at the original data itself in Tables 12(a) and 12(b). There is a clear and significant jump in all the variables in the year 2006-07 in case of India, following the definitional and procedural

changes as per the MSMED Act 2006. But no such change was visible in Assam. This is why the series relating to Assam appears to be more stable. It points to the fact that the governmental policy measures have had little impact on the MSME sector in Assam.

Putting together the results, we suggest the following policy guidelines for the MSME sector.

The variability/instability in growth in all four variables has implications for planning. It means that growth cannot be expected to follow a regular pattern. More efforts have to be put in the beginning, and only after a certain critical minimum effort, do substantial gains take place. But the gains do not maintain the increased momentum and sooner or later, taper down and assume a stagnant or very slow rate. This points to the need for extra efforts in the later stages to maintain growth with stability.

References

Bargal, M., Dashmishra, M., and Sharma, A.(2009). Performance Analysis of small scale industries – A study of pre-liberation and post-liberation period, *International Journal of Business and Management*, Vol. 1, No 2, weblink:www.sobiad.org/ejournals/journal_IJBM/ archives/ijbm 2009/06 Hitendra_Bargal.pdf, as accessed on March 1, 2017.

Chakraborty, D. K.(2005). *Paper Industry in Assam: An investigation into the production behavior and environmental issues*, unpublished Ph. D. Thesis, Gauhati University, Guwahati, Assam.

GoI (2018-19). Annual Report 2018-19, Ministry of MSME, Govt. of India, New Delhi.

Gupta, S.(2009). Future Prospects of Small Scale Industrial Sector of Punjab: An Empirical Assessment, *Communications of the IBIMA*, Vol. 7, No. 1, pp. 102-110.

Kumar, G.(2010). Growth, performance and productivity of rubber and plastic products industry in Punjab, *Annals of the University of Petrosani, Economics*, 10(4), 2010, 157-168, weblink: upet.ro/annals/economics/pdf/2010/20100416.pdf.

Mukherjee, R., Das, P. K., and Bhattacharya, U.K.(1999). Small scale industries in West Bengal, 1971-97: Data analysis for study of growth, *Economic and Political Weekly*, Vol. 34, No. 48, Nov. 27- Dec. 3, 1999, pp. 157-162, weblink:www.jstor.org/stable/ 4408658?seq=1 #page_scan_tab_contents, as assessed on March 1, 2017.

Patel A.(2010). *The Indian Banker*, Vol.5, No.6, June, 2010.

Sivalingam, T., A. Subbarayan, E. Bahskaran (2008). A study on the Performance of Micro and Small Enterprises in Tamil Nadu, *SEDME*, Vol. 35, No. 4, pp. 61-71

Sonia and Kansai Rajeev (2009). Globalisation and its impact on Small Scale Industries India, *PCMA Journal of Business*, Vol. 1, No. 2 (June, 2009) pp. 135-146, ISSN0974-9977, (Available in http://www.Publishingindia.com/Upload/Sample Article/PCMASample-Article.pdf, accessed on 12.06.2018.)

Vyasulu,V, and Kumar A.V.A.(1997). Industrialisation in Orissa-Trends and Structure, *EPW*, May 31, 1997, pp. 46-53.

APPENDIX

Table-1
Estimated Trend Equations and Instability Index for Number of Enterprises in India

Trend Equation	Coefficient B_0	B_1	B_2	B_3	R^2	AdjR^2	F	Instability Index (I_i)
Linear	23.1	35.098	--	--	0.886	0.877	100.890*	19.25
	(t = 0.727)	(t = 10.044)*						
Quadratic	- 4.531	44.845	-0.610	--	0.890	0.871	48.442*	19.72
	(t = - .085)	(t = 2.928)*	(t = -0.655)**					
Cubic	116.019	-33.254	11.209	-0.492	0.925	0.905	45.533*	16.90
	(t = 1.666)	(t = -0.911)	(t = 2.151)***	(t = -2.295)**				
Exponential	4.391	0.142	--	--	0.842	0.830	69.152*	22.63
	(t = 28.386)*	(t = 8.316)*						

*Significant below 1 percent level **Significant below 5 percent level ***Significant below 10 percent level

Figure-1
Cubic Curve plot for Number of Enterprises in India

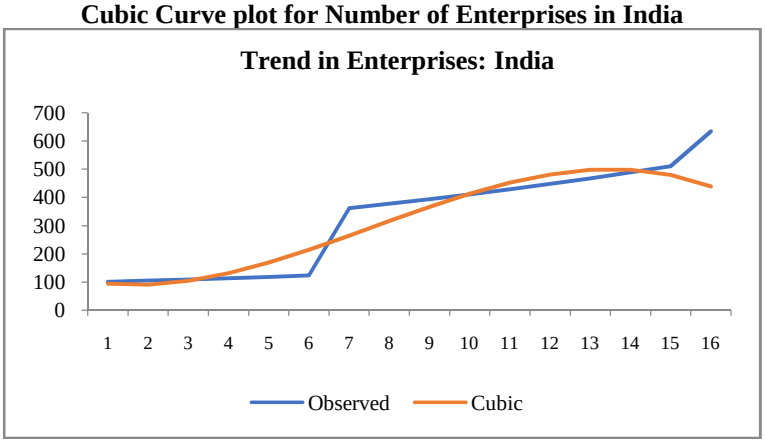


Table-2
Estimated Trend Equations and Instability Index for Employment in India

Trend Equation	Coefficient β	β_1	β_2	β_3	R^2	AdjR^2	F	Instability Index (I_i)
Linear	87.39	74.174	--	--	0.890	0.882	112.938*	17.91
	(t = 1.295)	(t = 0.627)*						
Quadratic	-15.424	108.448	- 2.016	--	0.901	0.885	58.993*	17.68
	(t = - 0.142)	(t = 3.7)*	(t = -0.203)**					
Cubic	248.747	- 53.944	21.157	- 0.909	0.936	0.920	58.571*	14.75
	(t =1.827)***	(t = - 0.802)	(t = 2.338)**	(t = -2.592)**				
Exponential	5.314	0.128	--	--	0.840	0.829	73.550*	21.57
	(t = 6.933)*	(t = 8.576)*						

*Significant below 1 percent level **Significant below 5 percent level ***Significant below 10 percent level

Figure-2
Cubic Curve plot for Employment in India

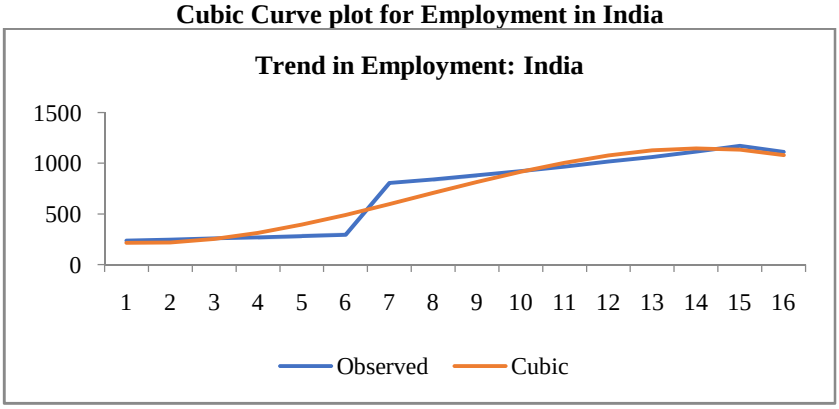


Table-3
Estimated Trend Equations and Instability Index for Investment in India

Trend Equation	Coefficient β_0	β_1	β_2	β_3	R^2	AdjR^2	F	Instability Index (I_i)
Linear	-2.745E7 (t = - 2.739)**	1.201E7 (t = 10.898)*	--	--	0.901	0.894	118.767*	26.84
Quadratic	- 3.049E7 (t = - 1.787)***	1.309E7 (t = 2.666)**	- 67031.713 (t = - 0.225)	--	0.902	0.885	55.071*	27.95
Cubic	7.321E6 (t = 0.325)	- 1.141E7 (t = - 0.967)	-154469.362 (t = 2.225)**	3.640E6 (t = 2.159)***	0.932	0.914	50.447*	24.17
Exponential	14.335 (t = 36.407)*	0.335 (t = 8.198)*	--	--	0.838	0.825	67.211*	34.48

*Significant below 1 percent level**Significant below 5 percent level***Significant below 10 percent level.

Figure-3
Cubic Curve plot for Investment in India

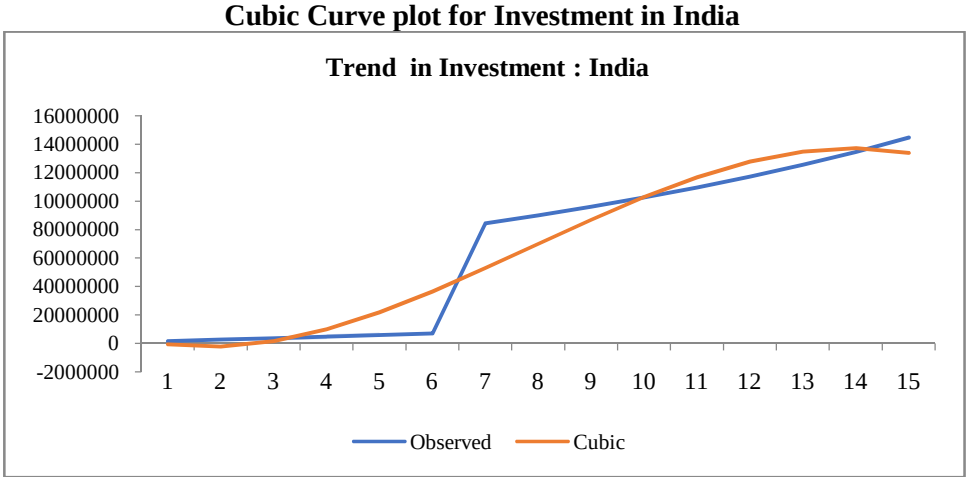


Table-4
Estimated Trend Equations and Instability Index for Production in India

Trend Equation	Coefficient β_0	β_1	β_2	β_3	R^2	AdjR^2	F	Instability Index (I_i)
Linear	-3.401E7	1.941E7	--	--	0.923	0.916	131.042	22.39
	(t = - 2.528)**	(t = 11.447)*					*	
Quadratic	-3.171E7	1.849E7	65729.9	--	0.923	0.907	59.662*	23.56
	(t = -1.352)	(t = 2.399)**	(t = 0.123)**					
Cubic	3.232E7	- 2.802E7	8.071E6	- 381181.362	0.963	0.951	77.956*	17.10
	(t = 1.211)	(t = - 1.762)	(t = 3.117)**	(t = - 3.127)**				
Exponential	15.920	0.290	--	--	0.906	0.897	105.602	24.80
	(t = 71.1074)*	(t = 10.276)*					*	

*Significant below 1 percent level **Significant below 5 percent level ***Significant below 10 percent level

Figure-4
Cubic Curve plot for Production in India

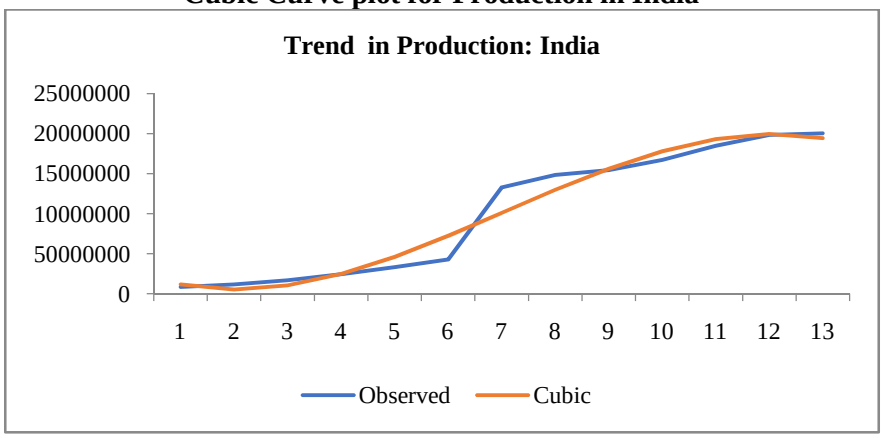


Table-5
Estimated Trend Equations and Instability Index for Number of Enterprises in Assam

Trend Equation	Coefficient β_0	β_1	β_2	β_3	R^2	AdjR^2	F	Instability Index (I_i)
Linear	14021.2	1833.469	--	--	0.993	0.992	1943.666*	2.645
	(t = 34.867)*	(t = 44.087)*						
Quadratic	12636.155	2295.151	-27.158	--	0.997	0.996	1855.013*	1.871
	(t = 29.59)*	(t = 17.839)*	(t = -3.691)*					
Cubic	11057.008	3265.889	- 165.679	5.432	0.999	0.999	3424.051*	0.936
	(t =25.634)*	(t = 15.327)*	(t = - 5.778)*	(t = 4.890)*				
Exponential	9.681	0.067	--	--	0.951	0.947	271.180*	
	(t = 246.706)*	(t = 16.468)*						6.812

*Significant below 1 percent level **Significant below 5 percent level ***Significant below 10 percent level

Figure-5
Cubic Curve Plot for Number of Enterprises in Assam

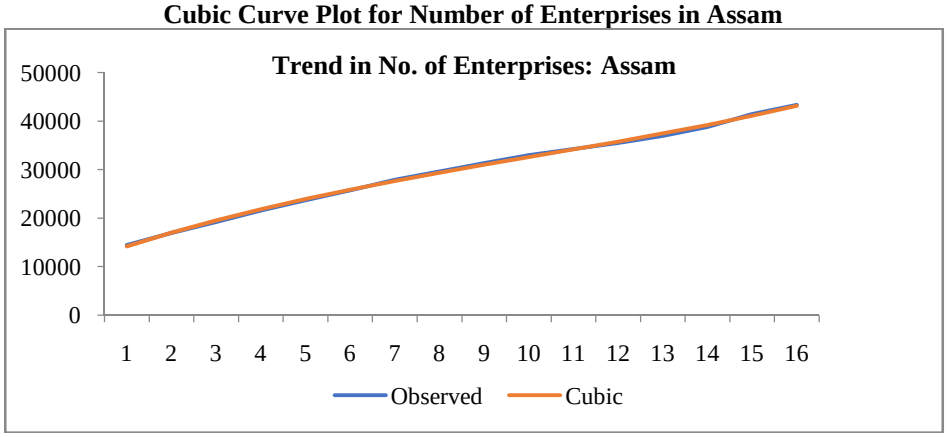


Table-6
Estimated Trend Equations and Instability Index for Employment in Assam

Trend Equation	Coefficient β_0	β_1	β_2	β_3	R^2	AdjR^2	F	Instability Index (Ix)
Linear	33975.9	14915.299	--	--	0.941	0.937	222.625*	11.43
	(t = 3.515)*	(t = 14.921)*						
Quadratic	71514.891	2402.302	736.059	--	0.979	0.976	307.930*	
	(t = 7.401)*	(t = 0.918)****	(t = 4.920)*					7.06
Cubic	47079.102	17423.545	-1407.432	84.058	0.987	0.984	310.937*	5.76
	(t = 3.959)*	(t = 2.966)**	(t = -1.780)***	(t = 2.744)**				
Exponential	11.068	0.097	--	--	0.987	0.986	1082.006*	5.39
	(t = 389.829)*	(t = 32.894)*						

*Significant below 1 percent level **Significant below 5 percent level *** Significant below 10 percent level

Figure-6
Cubic Curve Plot for Employment in Assam

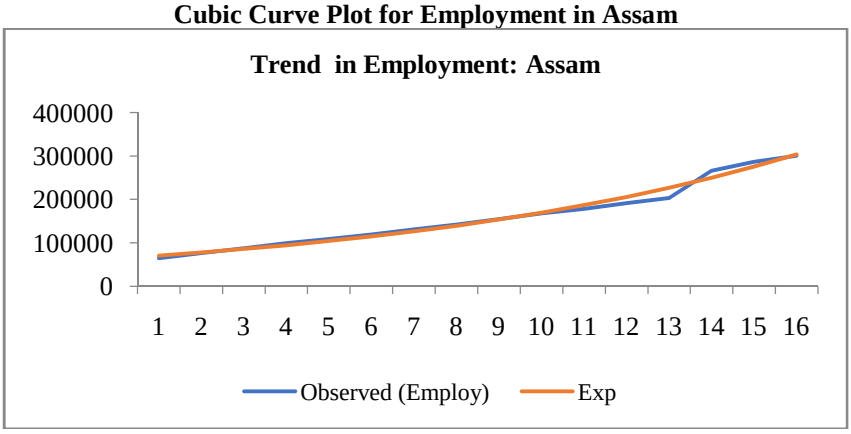


Table-7
Estimated Trend Equations and Instability for Investment in Assam

Trend Equation	Coefficient B_0	B_1	B_2	B_3	R^2	AdjR^2	F	Instability Index (Ix)
Linear	- 50795.228	22830.366	--	--	0.973	0.971	508.331	13.10
	(t = - 5.188)*	(t = 22.546)*						
Quadratic	10328.465	3594.028	412.306	--	0.994	0.994	1173.241*	5.96
	(t = 2.959)**	(t = 3.580)*	(t = 6.758)*					
Cubic	19583.233	- 8609.089	3311.552	- 97.555	0.999	0.999	5193.895*	2.43
	(t = 4.445)*	(t = - 3.956)*	(t = 11.308)*	(t = - 8.579)*				
Exponential	9.531	0.225	--	--	0.947	0.944	252.329*	18.20
	(t = 69.695)*	(t = 15.885)*						

*Significant below 1 percent level ** Significant below 5 percent level *** Significant below 10 percent level

Figure-7
Cubic Curve Plot for Investment in Assam

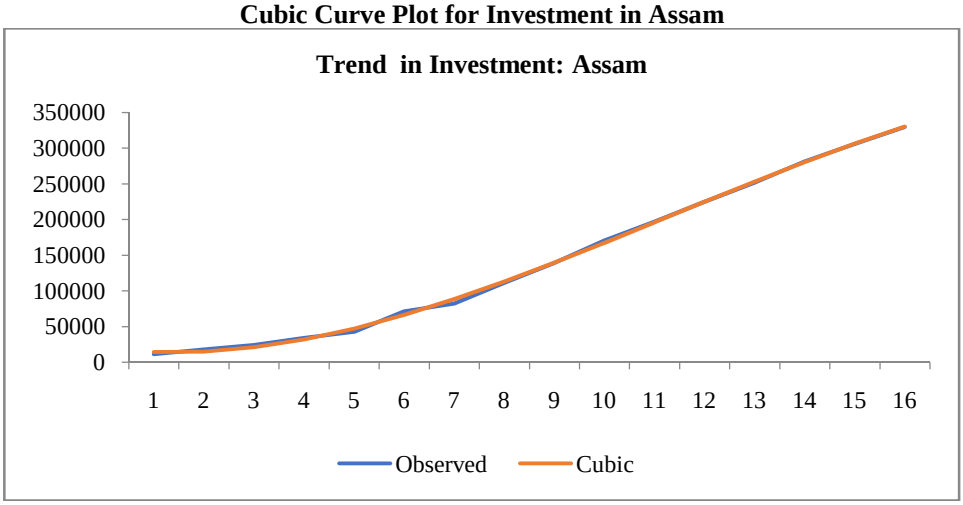
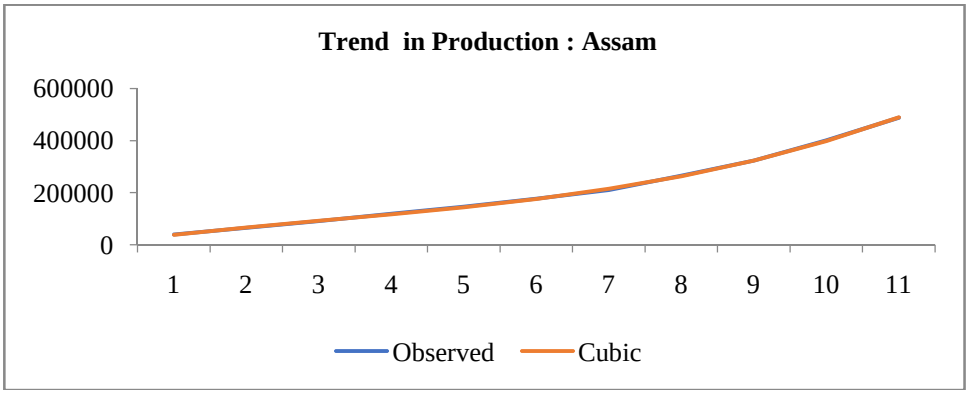


Table-8
Estimated Trend Equations and Instability Index for Production in Assam

Trend Equation	Coefficient β_0	β_1	β_2		R^2	AdjR^2	F	Instability Index (Ix)
Linear	- 42135.527	42184.841	--	--	0.944	0.938	152.762*	16.99
	(t = -1.820)	(t = 12.360)*						
Quadratic	48754.893	235..416	3495.785	--	0.995	0.994	787.489*	5.29
	(t = 3.880)*	(t = - 0.049)	(t = 8.948)*					
Cubic	4801.222	36541.470	- 3749.326	402.506	1.000	1.000	1.035E4*	0
	(t = 1.049)	(t = 11.571)*	(t = - 6.267)*	(t = 2.245)*				
Exponential	10.609	0.234	--	--	0.978	0.976	408.542*	10.57
	(t = 135.142)*	(t = 20.212)*						

*Significant below 1 percent level **Significant below 5 percent level ***Significant below 10 percent level

Figure-8
Cubic Curve Plot for Production in Assam



Summary results are presented in Tables 9 and 10 below.

Table-9
Summary of Best fit Model for India and Assam

Variable	Best-fit Model	
	India	Assam
No. of Enterprises	Cubic	Cubic
Employment	Cubic	Exponential
Investment	Cubic	Cubic
Production	Cubic	Cubic

Source: Summarised by authors from Tables 1- 8.

Table-10
Summary result of Instability Index for India and Assam*

Variables	Instability Index	
	India	Assam
No. of Enterprises	16.9	0.936
Employment	14.75	5.39
Investment	24.17	2.43
Production	17.10	0.00

Source: Summarized by authors from Table 1- 8.
*Based on the best fit model in each case

Table-11(a)
Old Definition of MSMEs in India

	Investment in plant and machinery/equipment(excluding land and building)	
	Manufacturing Enterprises	Service Enterprises
Micro	Upto Rs. 25 lakh	Upto Rs. 10 lakh
Small	More than Rs. 25 lakh and upto Rs. 5 Crore	More than Rs. 10 lakh and upto Rs. 2 Crore
Medium	More than Rs. 5 crore and upto Rs. 10 Crore	More than Rs. 2 crore and upto to 5 Crore

Source: Chapter 3, MSMED Act, 2006, Ministry of MSME, Govt. of India.

Table-11(b)
New Definition of MSMEs in India

	Manufacturing & Services Enterprises ***Composite Criteria: Investment & Annual Turnover (AT)**
Micro	Invt < 1 crore
	AT < 5 crores
Small	Invt < 10 crores
	AT < 50 crores
Medium	Invt < 50 crores
	AT < 250 crores

Source: Ministry of Finance, GOI

Table-12(a)
Number of Working Enterprises, Employment, Production and Fixed Investment of MSMEs in India during 2000-01 to 2015-16

Years	**No. of working enterprises (in Lakhs)**	**Employment (in Lakhs)**	**Production (in Rs. Crores) Current Prices**	**Adjusted values of Production (in Rs. Lakhs) Base year:2011-12**	**Fixed Investment (in Rs. Crores) Current Prices**	**Adjusted values of fixed investment (in Rs. Lakhs) Base year: 2011-12**
2000-01	101.1	238.73	261297	8447741.192	146845	1658127.269
2001-02	105.2	249.33	282270	11819606.14	154349	2677415.506
2002-03	109.5	260.21	314850	16926189.22	162317	3749824.658
2003-04	114.0	271.42	364547	24288707.73	170219	4794095.836
2004-05	118.6	282.57	429796	33388986.67	178699	5854758.75
2005-06	123.4	294.91	497842	42659558.88	188113	6991577.975
2006-07	361.76	805.23	1198818	132991517.6	868543.79	84278128.41
2007-08*	377.36	842.0	1322777	148238627.1	920459.84	89967558.54
2008-09*	393.7	880.84	1375589	154358210	977114.72	96001734.71
2009-10*	410.80	921.79	1488352	167143130.6	1038546.08	102514813.6
2010-11*	428.73	965.15	1653622	184856957	1105934.09	109462747.4
2011-12*	447.64	1011.69	1788584	198353157	1182757.64	117145102.4
2012-13*	467.54	1061.40	1809976	200384685.9	1268763.67	125526122.7
2013-14*	488.46	1114.29	#	#	1363700.54	134547109.9
2014-15*	510.57	1171.32	#	#	1471912.94	144600287.2
2015-16*	633.88	1109.89	#	#	#	#

Source: Various issues of Annual Report of MSMEs from 2006-07 to 2017-18, Ministry of MSMEs, GoI.

*Projected, # Not available

Table-12 (b)
Number of Working Enterprises, Employment, Production and Fixed Investment of MSMEs in Assam during 2000-01 to 2015-16

Year	No. of working enterprises	Employment	Production (in Rs. Lakhs) Current Prices	Adjusted values of Production Base year:2011-12	Fixed Investment (in Rs.Lakhs)	Adjusted values of fixed investment Base year:2011-12
2000-01	14453	64623	115303	38881.2892	22009	10856.92167
2001-02	16981	76161	131316.81	64626.96445	26897.95	17497.71221
2002-03	19227	87276	147696.41	90300.31868	31766.89	24050.79431
2003-04	21591	99071	166673.31	118414.2446	38965.71	33564.23425
2004-05	23658	108467	186371.51	145887.3269	46085.89	42470.02537
2005-06	25740	119247	209312.37	177141.9045	69862.77	71182.59631
2006-07	27912	131099	234827.04	210021.6339	79145.49	81726.34915
2007-08	29604	141570	279548.01	265028.9771	105782.91	110918.0423
2008-09	31315	154484	329183.11	322543.5773	132131.17	138980.9457
2009-10	32993	167271	397639.91	400158.9968	162032.85	170683.3206
2010-11	34207	177729	479318.88	487703.4449	187590.44	197034.0681
2011-12	35494	190932	#	#	215366.59	224810.2181
2012-13	36945	202603	#	#	242764.06	251508.2009
2013-14	38805	265574	#	#	273863.14	281058.8281
2014-15	41434	286070	#	#	300786.43	306071.1748
2015-16	43332	299918	#	#	326384.39	329792.7576

Source: Various issues of Economic Survey Report, Assam from 2010-11 to 2017-18. # Not available.

Man & Development
Vol. XLIII No. 4, December 2021,
http://www.crrid.res.in/journal/
ISSN 0258-0438

SANITATION WORKERS: A NEGLECTED COMMUNITY OF INDIAN CIVILIZED SOCIETY

Raghavendra R H[1] and Anil Kumar R[2]

Abstract: Sanitation workers are those who work in any part of the sanitation chain. One of the most important jobs in society, and yet they remain unseen and unappreciated. The stigmatized caste system in India remains to be the key determinant of the fate of these workers. These workers often come into direct contact with human waste, working with no equipment or protection, which exposes them to a wide variety of health hazards and disease, can cause workers to lose consciousness or die. There is an urgent need to look into their problems and it cannot be addressed without having a detailed understanding of the depth and width of sanitation workers. Hence, the present study covers a number of areas like vastness of sanitation workers in India, pathetic conditions of sanitation workers, social and economic status of sanitation workers, deaths due to sanitation related works and an alternative livelihood to sanitation work. Finally suggested to what the government needs to do for the sanitation workers.

Keywords: Sanitation workers, Manual Scavengers, Safai karmacharis, Human Rights, Rehabilitation,

'One of modern India's great shames is the official failure to eradicate 'manual scavenging', the most degrading surviving practice of untouchability in the country.' - Harsh Mander[i]. (Columnist)

I. Introduction

Sanitation workers or safai karmachari's are the vividly neglected community of India's civilized society. Today we are living in the world where everything is

[1] Assistant Professor, Department of Commerce, Government First Grade College Shiralakoppa 577428, Shikaripura Tq, Shimoga Dist, Karnataka St.
Email: raghavpondiuni@gmail.com

[2] Assistant Professor & Head, Department of Economics, Government First Grade College Shiralakoppa 577428, Shikaripura Tq, Shimoga Dist, Karnataka St.
Email: anil15624@gmail.com

digitalized and robotized. But sanitation work is still a manual work. Many of these jobs exist in the informal economy, and these workers are not recognized for the work that they do, nor are they protected by basic labor rights. Recurrent news items about sewer deaths, pit collapses, and illnesses are often dismissed as isolated incidents rather than part of a systemic issue.

Under Indian Constitution article 21 guarantees right to livelihood or work, right to life and Liberty and right to health and so on. Under DPSP Article 41 talks about right to work, to education and public assistance in certain cases. Here public assistance guarantees safe and secure life to all citizens of this country. Again Article 43 clearly states that it is the duty and responsibility of states protects all workers with suitable legislation and economic organization. The Constitution of India's Preamble is Null without these three words i.e. Justice, Liberty and Equality.

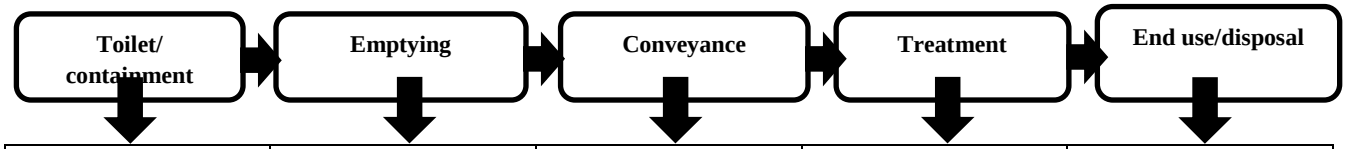
The plight of the sanitation workers in India is unheard and unheeded sound. Media often reports about sewer deaths but society will forget it easily and it won't attract mass attention. This study covers number of areas like vastness of sanitation workers in India, pathetic conditions of sanitation workers, social and economic status of sanitation workers, deaths due to sanitation related works and an alternative livelihood to sanitation work.

a) Who are sanitation workers?

According to World Health Organization, The term sanitation workers refer to all people—employed or otherwise responsible for cleaning, maintaining, operating, or emptying a sanitation technology at any step of the sanitation chain . This includes toilet cleaners and caretakers in domestic, public, and institutional settings; those who empty pits and septic tanks once full and other fecal sludge handlers; those who clean sewers and manholes; and those who work at sewage and fecal waste treatment and disposal sites (Dalberg Advisors, 2017)

Improving the working conditions of sanitation workers would contribute to four of the 17 Sustainable Development Goals (SDGs), to name a few: end poverty in all its forms everywhere (SDG 1) by promoting access of the poor to basic services; ensure healthy lives and promote well-being for all at all ages (SDG 3) by reducing exposure to unsafe chemicals on the job; ensure availability and sustainable management of water and sanitation for all (SDG 6); and focus on decent work (SDG 8). The SDG framework offers an opportunity to revert and improve the situation of sanitation workers (WHO, 2019).

Table-1
Different Types of Sanitation workers



Sweeping Latrine cleaning Domestic work Community/public toilet keeping School toilet cleaning Municipalities, government, and private offices cleaning	Manual emptying Fecal sludge handling Mechanical emptying (including septic tank desludging)	Manual transport Mechanical transport Sewer cleaning Sewer and pumping station maintenance Manhole cleaning	Treatment plant work Sewage treatment plant cleaning Wastewater and sludge handling at sewage treatment plants	Manual disposal Mechanical disposal

Source: Adapted from Dalberg Advisors 2017.

Table 1 shows the types of sanitation workers, 'Sanitation work' includes emptying toilets, pits and septic tanks; entering manholes and sewers to fix or unblock them; transporting faecal waste; working treatment plants; as well as cleaning public toilets or defecation around homes and businesses. A study conducted by Dalberg Associates in 2018, estimated 5 million sanitation workers in various urban locations across India. They were categorised into nine broad types of sanitation workers identified along the sanitation value chain, including those engaged in cleaning sewers, cleaning latrines, faecal sludge handling, railway cleaning, work in waste treatment plants, community and public toilet cleaning, school toilet cleaning, sweeping and drain cleaning, and domestic work (Dalberg Advisor, 2017) .

b) Lack of data on sanitation workers:

One of the striking challenges that the sanitation workers face in the country, in addition to the various vulnerabilities and hazards that they face in their day-today work, is the fact that various levels of governments are not even counting them(WHO, 2019). We do not have reliable statistics of people who are engaged in this kind of work. This problem cannot be addressed without having a detailed understanding of the depth and width of this labour force. How many of these workers are engaged across states and towns? As urban local bodies recently started to contract out this work to individuals or agencies, the need and compulsions for keeping and tracking such work is paramount. The currently available data are limited to this issue of manual scavenging. The available data on manual scavenging from various sources provide a contradictory picture of the situation (WHO, 2019).

II. Objectives of the study

1) To understand the Indian scenario of sanitation workers.
2) To assess the actual quantity of sanitation workers in India.
3) To understand the challenges faced by sanitation workers.
4) To identify areas of action for building a concerted effort to improve the conditions of sanitation workers.

1) Indian scenario of sanitation workers

A substantial formal and permanent sanitation workforce is now in India, with basic working conditions, protected by law. However, undesirable and high-risk jobs are typically subcontracted to temporary informal workers. Manual sanitation work includes daily cleaning, carrying, disposing of, or otherwise handling untreated human excreta from latrines, open drains, pits, or railway tracks. Sewer workers and drain cleaners enter sewers and manholes to manually remove solid waste and other debris blocking the sewerage system. An estimated

one manhole worker dies unblocking sewers by hand every five days in India (BBC 2018). This number may actually be larger because many deaths are underreported. Low-grade manual sanitation work is poorly paid. Workers most likely do not have fixed wages and are often victims of extortion—some workers report getting paid in leftover or basic food items (Human Rights Watch 2014). Both men and women work as manual sanitation workers. Those perceived to be of a lower caste suffer discrimination in health care, education, employment, access to land, and employment and wages. Human and employment rights are often violated because there are few real opportunities to move away from traditional low-grade occupations. Their occupation has a negative impact on their families' lifestyles and on their children's schooling and job aspirations because of stigma. Manual scavenging is prohibited by law. However, challenges remain regarding the systemic discrimination of groups perceived as being of a lower caste and the multiple layers of subcontracting the high-risk jobs to temporary and informal workers, for which oversight and enforcement of laws by local authorities are weak (Human Rights Watch 2014).

In Mumbai alone, the reported figures collected under the Right to Information Act (2006) showed an average of 25 sanitation worker deaths per month between 2002 and 2005. These figures are likely to be conservative because of unreported incidents and the figures relating to 14/24 BMC wards (Anand 2007). An estimated 5 million full-time sanitation workers are in India, with 2 million working in high-risk conditions (Dalberg Advisors 2017; Soju, Trivedi, and Purohit 2015). Despite prohibition of manual scavenging, 20,596 people identified as manual scavengers in 163 (of the 700) Indian districts. Another estimate suggests this number should be more than 70,000 (Dalberg Advisors 2017). 60 to 70 percent of workers are located in urban areas, and 50 percent of these workers are women (Dalberg Advisors 2017).

a) Social stigma and caste oriented Work

In India, conditions of sanitation workers is appalling and pathetic. They work, often in appalling conditions and is reserved for Scheduled Castes, officially designated groups of historically disadvantaged communities that live on the fringes of society. And their lives remain substantially unchanged despite India's overall economic, social and technological advancements. With a population of 1.3 billion people, India faces enormous challenges in providing and maintaining clean water and safely managed sanitation services for its people. Significant progress has been made on improving access to clean water and decent toilets, but access to safely managed sanitation services still lags behind. Some sources estimate that there are around five million sanitation workers in India (including toilet cleaners), two million of which are working in high-risk conditions. Those affected by manual scavenging are the most vulnerable and stigmatized group, mostly belonging to the lowest rungs of India's caste system, known as 'Dalits'.

"As for Dalits, who do the job — most of them are uneducated, unaware of legal dogmas. Generations of their families have done the same work, and they hold little hope for careers other than this denigrating profession." The job is often handed down through generations, with little opportunity to escape the cycle. Manual scavenging has persisted even as India has modernized, and is deeply embedded in the country's caste system, transcending religion – even among Indian Muslims there are communities associated with cleaning latrines and sewers (The Guardian, 2018). Despite manual scavenging being outlawed by the Government in 1993, and the law strengthened in 2013, over 20,000 people were identified as manual scavengers in 2018 and other estimates point to this number being much higher. Some of these workers, predominantly women and girls, are involved in the manual cleaning of dry 'bucket' latrines, carrying the waste away in baskets. Others are involved in cleaning railway tracks and other areas where people practice open defecation, generally with very rudimentary tools. Manual scavenging often involves hazardous working conditions, with the workers using their bare hands or basic tools to clean, handle and dispose of untreated human waste. It is common for workers to be immersed in human waste, with some even losing their lives whilst cleaning septic tanks or unblocking sewers. Between 2017 and late 2018, there was an average of one death of a sanitation worker every five days in the country, according to official data (Water Aid, 2019). Other sources estimate three times as many, with over three deaths every five days. Most of these workers are not formally recognized, meaning they have no benefits or social protection. Pay is very poor, and workers are often at risk of extortion – some even being paid with leftover food rather than money. Workers face widespread and systemic discrimination; their human rights are violated and there are very few opportunities for them to move away into other jobs. When it comes to operating sewers, pits, septic tanks and treatment facilities, there is a substantial formal and permanent sanitation workforce, with basic working conditions that are protected by law. However, the less desirable and high-risk jobs are frequently sub-contracted to temporary informal workers who are lacking in such protections. As such, manual scavenging is also common in these operations, with workers operating without protective equipment. Progress has been made in terms of advocating for the rights of sanitation workers and identifying appropriate solutions. Many local and international organizations continue to raise awareness and empower sanitation workers.

b) Legal Protection

Ending the practice of manual scavenging will not be easy. The profession is deeply rooted in the Indian caste system, which dates back 2,000 years. The system, for centuries, has dictated aspects of the Hindu social, professional, and religious life, pushing Dalits to cleaning manholes and sewers — even as the Constitution of India, adopted in 1949, prohibits caste-based discrimination.

Moreover, manual scavenging was prohibited in India by the Employment of Manual Scavengers and Construction of Dry Latrines (Prohibition) Act (1993). In 2013, the law was extended and clarified to include insanitary latrines, ditches, pits, railway tracks, sewers, and septic tanks in the Prohibition of Employment as Manual Scavengers and Their Rehabilitation Act. This law calls for rehabilitation of manual scavengers and provides support for alternative employment and entrepreneurship opportunities. In practice, however, there remain several challenges to the implementation of the laws and emancipation of sanitation workers in India, such as the denial of authorities of the practice since the prohibition. Other challenges include combating the systemic discrimination Dalits face, which affects their education and real opportunities to become entrepreneurs and the multiple layers of subcontracting that enable manual scavenging to continue without oversight or enforcement of laws by local authorities (Human Rights Watch 2014). Progress has been made in advocating for sanitation workers' rights and identifying appropriate solutions. Many local and international organizations (for example, Safai Karmachari Andolan, Navsarjan Trust in Gujarat and so on) continue to raise awareness and empower sanitation workers through capacity building and guidance and supporting leveraging trade union mechanisms to support sanitation workers. Standard operating procedures for cleaning sewers and septic tanks have been developed by the Ministry of Housing and Urban Affairs to eliminate hazardous cleaning, prevent accidents and casualties, and limit the risk of diseases resulting from improper practice of cleaning of sewers or emptying of septic tanks.

2) Actual quantity of sanitation workers in India

The practice of manual scavenging, officially banned since decades in India, continues with impunity in several States. The 2011 Socioeconomic and Caste Census estimates that more than 182,000 Indians work as manual scavengers, while human rights groups peg the number at 770,000 (Changoiwala, 2019). Even after a complete ban on manual scavenging, the government has failed to identify the exact number of people doing it.

Despite the introduction of several mechanised systems like 2013 law prohibiting employment of manual scavengers, a government survey identified 54,130 people engaged in this job as of July 2019. The figure is understated as the survey was carried out only in areas where "there are reasons to believe the existence of manual scavengers". The survey was conducted in 170 districts in 18 states.

There are more than 700 districts in the country but the survey was carried out in 170 districts only. Out of this, complete information has been received only from few districts. The numbers are expected to rise. The actual numbers are quite high. The state governments are deliberately trying to reduce

them because instead of ending the practice, they want to hide the fact they still have people who carry out manual scavenging work."

Table-2
Details of manual scavengers identified after MS Act, 2013

S. No	Name of State/UT	No. of Identified Manual Scavengers		Total
		As per Survey under MS Act, 2013	As per National Survey 2018	
1	Andhra Pradesh	78	1982	2060
2	Assam	154	542	696
3	Bihar	137	0	137
4	Chattisgarh	3	0	3
5	Gujrath	0	108	108
6	Jharkhand	0	201	201
7	Karnataka	732	1754	2486
8	Kerala	0	600	600
9	Madhya Pradesh	36	562	598
10	Maharastra	0	7378	7378
11	Odisha	237	0	237
12	Punjab	91	142	233
13	Rajasthan	338	2590	2928
14	Tamil Nadu	363	62	425
15	Uttara Pradesh	12095	18280	30375
16	Uttarakhand	137	4787	4924
17	West Bengal	104	637	741
	Total	**14,505**	**39,625**	**54,130**

Source: Ministry of Social Justice and Empowerment, Answered in Rajya sabha, 24/07/2019

3) Major challenges and risks faced by Sanitation Workers:

"I do not want to attain Moksha, I do not want to be reborn. But if I have to be reborn, I should be born an untouchable, so that I may share their sorrows, sufferings and the affronts leveled at them, in order that I may endeavour to free myself and them from that miserable condition. I therefore, pray that I should be born again, I should do so not as a Brahmin, Kshatriya, Vaishya or Shudra but as an Atishudra a Bhangi"… **-- Mahatma Gandhi**[ii]

Manual scavengers are at a double disadvantage. They are members of lower castes and as such, face enormous discrimination in society, and second, are disadvantaged because they are manual scavengers who clean human excreta. Also many challenges they face are discussed here.

- **Occupational and environmental health and safety** is important because sanitation workers are exposed to multiple occupational and environmental hazards. Several people of this community suffer from skin diseases and tuberculosis. According to Tata Institute of Social Sciences, 80 per cent of manual scavengers die before they turn to 60.

Direct contact with human excreta, with workers often operating in enclosed spaces that have noxious gases (Doron and Jeffrey 2018).

- **Weak legal protection** results from working informally, lack of occupational and health standards, and weak agency to demand their rights.
- **Financial insecurity** is a great concern because typically, informal and temporary sanitation workers are poorly paid, and income can be unpredictable.
- **Social stigma and discrimination** exist, and in some cases, are experienced as total and intergenerational exclusion.

Moreover, much of this sanitation work is performed in degrading and demeaning conditions, and for low wages and in insecure working conditions. These poor conditions reflect the continued indifference of the society at large, and an incomplete understanding on the policy side of what the sanitation challenge consists of. Crucially, workers and their families remain trapped in circumstances in which they have to keep performing unsafe and humiliating sanitation work.

Table-3
Sewer Death Cases during 1993 and 05 July 2019

S. No	State/UT	No of Deaths
1	Andhra Pradesh	18
2	Bihar	12
3	Chandigarh UT	03
4	Delhi	49
5	Goa	06
6	Gujarat	156
7	Haryana	70
8	Karnataka	73
9	Kerala	03
10	Maharashtra	25
11	Madhya Pradesh	07
12	Punjab	35
13	Rajasthan	38
14	Tamil Nadu	206
15	Telangana	04
16	Tripura	02
17	Uttarakhand	06
18	Uttar Pradesh	78
19	West Bengal	18
20	Chhatisgarh	05
	Total	**814**

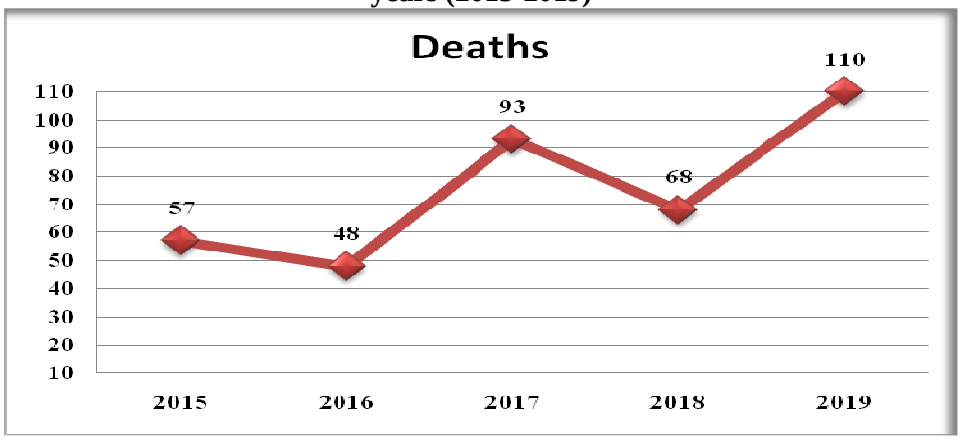
Source: National Commission for Safai Karmacharis, Report 2019.

Leaders and statesmen such as Mahatma Gandhi and B.R. Ambedkar have commented on this and proposed cleaning toilets. However, these practices continue both in rural India, where dry latrines still get cleaned, and, over the last few decades, in urban India, where men and women physically get inside sewer networks and septic tanks to clean blockages despite extreme hazards and risks. There are deaths daily, reported and unreported, and severe social stigma is a constant companion.

Table 3 above shows Sewer Death Cases since 1993 to 05 July 2019 received from State/UT Governments. It refers to the number of people who died while cleaning sewers and septic tanks in the country. According to latest figures from the National Commission for Safai Karmacharis, there were 814 sewer deaths in the country from 1993 to 2019 from 20 states, including Tamil nadu recorded 210 deaths, Gujarat recorded 156, followed by UP and Karnataka with 78 and 73 deaths, respectively. Last year, the NCSK estimated, based on data collected from newspaper reports and numbers provided by a few state governments that on average one person died every five days while cleaning sewers and septic tanks since 2017 (The Wire, 2019).

a) Rising a stink

Figure-1
Number of deaths while cleaning sewers and septic tanks during the last five years (2015-2019)



Source: Ministry of Social Justice in the lok sabha on February, 2020

Figure 1 shows the number of deaths while cleaning sewers and septic tanks during the last five years (2015-2019). According to National Commission for Safai Karamcharis, the number of people who died while cleaning sewers and septic tanks in the country has increased by almost 62 per cent, from 68 in 2018 to 110 in 2019 (The Hindu, 2020). Manual scavenging, is banned under the Prohibition of Employment as Manual Scavengers and their Rehabilitation Act,

2013. Despite the strict law, the death toll of manual scavenging continues to rise. According to the Commission's reports, there had been 68 deaths in 2018, 93 in 2017, 48 in 2016 and 57 in 2015 and 2019 saw the highest number of cases during the past five years, with 110 deaths. These cases were reported from 18 States and Union Territories, while 13 States and UTs submitted "nil reports". The number of people who died while cleaning sewers and septic tanks in the country increased by almost 62 per cent from 68 in 2018 to 110 in 2019, according to a reply given by the Social Justice and Empowerment (SJE) Ministry to the Lok Sabha in February 2020.

4) To identify areas of action for building a concerted effort to improve the conditions of sanitation workers.

Ministry of Social Justice and Empowerment is implementing Self Employment Scheme for Rehabilitation of Manual Scavengers (SRMS) under which the following rehabilitation benefits are provided to the identified manual scavengers.

1. Onetime cash assistance of Rs 40,000/-
2. Skill Development Training with stipend of Rs 3,000/-
3. Capital subsidy up to Rs 2, 32,000/- to those who have availed bank loans for self employment projects.

The Self Employment Scheme for Rehabilitation of Manual Scavengers (SRMS) was introduced in January, 2007 with the objective of rehabilitating the remaining manual scavengers and their dependents in alternative occupations by March, 2009. However, as this could not be done by the target date, the Scheme was extended up to March, 2010, with a provision for the coverage of spill-over of beneficiaries even thereafter, if required. As per the updated number, reported by States/UTs, after launch of the Scheme, 1.18 lakh manual scavengers and their dependents in 18 States/UTs were identified for implementation of the Scheme. (NSKFDC)

The Central Sector Self Employment Scheme for Rehabilitation of Manual Scavengers (SRMS) has been revised under the "Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013" effective from Nov., 2013.

Table 4 presents the state wise details of rehabilitation benefits provided under SRMS to identified manual scavengers and their dependents from 2013-14 to 18/07/2019**.** India's policy attention to sanitation workers is heavily oriented towards rehabilitation of manual scavengers (by training them for alternative income generation), and some limited forms of compensation and welfare support. And yet, the schemes for compensation and welfare have been severely underperforming. It is found that families of sanitation workers are unable to get meaningful training or financial support for

alternative employment from government programmes designed for this purpose.

Table-4
Rehabilitation benefits provided under SRMS to identified manual scavengers and their dependents from 2013-14 to 18/07/2019 below

S No	Name of State/UT	Rehabilitation benefits		
		Onetime Cash Assistance (No. of Beneficiaries)	Skill Development Training (No. of Beneficiaries)	Capital subsidy (No. of Beneficiaries)
1	Andhra Pradesh	1460	0	0
2	Assam	682	45	0
3	Bihar	131	18	0
4	Chattisgarh	3	0	0
5	Gujrath	96	19	0
6	Jharkhand	108	24	0
7	Karnataka	1505	80	190
8	Kerala	504	161	0
9	Madhya Pradesh	341	58	0
10	Maharastra	5484	0	0
11	Odisha	218	66	83
12	Punjab	214	62	36
13	Rajasthan	2359	257	0
14	Tamil Nadu	364	29	47
15	Uttara Pradesh	19385	6152	480
16	Uttarakhand	1889	280	74
17	West Bengal	654	132	97
	Total	**35397**	**7383**	**1007**

Source: Ministry of Social Justice and Empowerment, Answered in Rajya sabha, 24/07/2019.

But experts feel such one-time measures are not enough. They say that a more community-centric model should be taken, where the entire community is given more opportunities to help them come out of this practice.

a) What the Government Needs to Do

In India, manual scavengers' search for dignity and basic rights has still not ended. Yet another year has passed and no concrete step has been taken by the government. Govt must get its hands dirty to rescue manual scavengers. Hence, a proper rehabilitation scheme which provides adequate skill development and employment opportunities is required.

A) There is a need to shift from manual to technology – based scavenging for cleaning sewage tanks and drains.

B) Ensure discrimination-free, secure and alternate livelihoods by providing skill development and livelihoods training to women, linking them to

government employment schemes and entitlements as well as ensuring their land rights.

C) Create a favourable environment through community awareness and sensitization of local administration.

D) Build the capacity of the community to promote rehabilitation efforts and self-reliance and also build leadership in the community with a particular focus on dalit women.

E) Manual Scavengers are invisible. Authorities need to identify, accept and recognise them. A proper montoring channel should be aligned to schemes such as NSKFDC to get better results on ground.

There should be active coordination between the Centre and the state governments in order to eliminate manual scavenging. It is only through combined efforts of citizens, agencies and governments we can make a worthwhile contribution to uplift their lives.

III) Conclusion

Modernity and urbanization have brought many changes in India and around the world. But in a country like India, the complexities of the caste system often prevent dalits in the social hierarchy from enjoying a dignified life. Despite strong constitutional provisions and judicial interventions, the government agencies have been terribly negligent in uplifting the downtrodden in society. With the lack of legal awareness among sanitation workers, there is an urgent need to create awareness among sanitation workers to know about their legal and constitutional rights. Additionally, outreach programme must be done for sanitation workers to inform them about their right to compensation, to demand protective gear and assert their dignity of labour. Ultimately, it is only through combined efforts of citizens, agencies and governments, we can make a worthwhile contribution to uplift their lives.

Endnote

[i] https://www.thehindu.com/opinion/columns/Harsh_Mander/indias-great-shame/article4097808.ece

[ii]. http://www.trinicenter.com/WorldNews/ghandi5.htm#:~:text=the%20Untouchables%2C%20Mr.,Gandhi%20said%3A,them%20from%20that%20miserable%20condition.

References

BBC. (2018). *Indian sewers: Dalits or 'untouchables' unblock sewers by hand.* UK: BBC News.

Dalberg Advisor (2017). *Sanitation Worker Safety and Livelihoods in India: A Blueprint for Action—Phase 1:Understanding the Problem.* New Delhi, India.: Dalberg Advisors,.

Jeffrey, A. D. (2018). *Waste of a Nation - Garbage and Growth in India.* Harvard University Press: Harvard.

Ministry of Social Justice and Empowerment (2019). *Survery regarding manual scavenging.* New Delhi: Ministry of Social Justice and Empowerment.

Nath, D. (2020, February 11). 110 deaths by cleaning sewers, septic tanks in 2019. *The Hindu* , pp. 1-2.

S. Anand (2007), "*Life Inside a Black Hole*", Tehelka Magazine, Vol4. Issue 47, 8th December, 2007.

Soju, Trivedi, and Purohit 2015 "*Occupational Health Issues of Sewage and Sanitary Workers*". ENVIS NIOH, National Institute of Occupational Heath, India.

The Guardian, (2018, Sept 10). *Manual scavenging': death toll of Indian sewer cleaners revealed*. *The Guardian* , pp. 1-3.

Water Aid. (2019). *The hidden world of sanitation workers.* India: WHO.

WHO. (2019). *"Health, Safety and Dignity of Sanitation Workers: An Initial Assessment."*. Washington: World Bank .

Web-Sources

Changoiwala, P. (2019, Sept 20). *For India's Caste-Based Sewer Cleaners, an Uncertain Robot Rescue.* Retrieved August 2020, 24, from Undark: https://undark.org/2019/09/20/sewer-robots-combat-sewer-scavenging-india/

Human Rights Watch. (2014).Cleaning Human Waste, "Manual Scavenging" Caste, and Discrimination in India https://www.hrw.org/report/2014/08/25/cleaning-humanwaste/manual-scavenging-caste-anddiscrimination-india

Ministry of Social Justice (2020, Feb 13). *Manual scavenging*. Retrieved August 24, 2020, from Vajiram and Ravi IAS Study centre: https://vajiramias.com/current-affairs/manual scavenging/5e44dc5c1d5def4f3bf9226e/

NCSK. (2019, July 5). *INFORMATION RECEIVED BY THE COMMISSION ABOUT NUMBER OF SEWER DEATHS AND COMPENSATION PAID SINCE 1993 TO 05 JULY 2019*. Retrieved August 24, 2020, from https://www.ncsk.nic.in/: https://www.ncsk.nic.in/sites/default/files/Sewer-Death-Cases.pdf

The Wire, (2019, July 24). *50 People Died Cleaning Sewers in the First Six Months of 2019.* Retrieved August 2020, 24, from https://thewire.in/: https://thewire.in/labour/manual-scavenging-sewer-deaths-2019

Man & Development
Vol. XLIII No. 4, December 2021,
http://www.crrid.res.in/journal/
ISSN 0258-0438

SOCIAL SECTOR DEVELOPMENT IN INDIA: AN EVALUATIVE STUDY ON STATES AND UTs

Hari Chand[1], A K Tiwari[2] and K C Sharma[3]

Abstract: This paper examines empirically the relative performance of 28 Indian States and 7 Union Territories on social sector development and human development. The States and Union Territories are ranked on the basis of social sector development and human development. For the purpose of this study, 34 indicators of social sector development have been selected rationally. The information and data are mainly taken from reliable secondary sources. In order to rank the states on the basis of level of development, most acceptable method of development index has been used in the present study. Statistical tools such as Mean, Standard Deviation and Rank Correlation co-efficient have been used as per the requirement. On the basis of this study, it was found that level of social development was the highest in Andaman and Nicobar Islands followed by Tripura, Sikkim. Tamil Nadu, Himachal Pradesh, Mizoram, Goa, Puducherry, Chandigarh and Kerala respectively, whereas Bihar was placed at the bottom place preceded by Uttar Pradesh, Madhya Pradesh, Rajasthan, Jharkhand, Assam, Haryana, Meghalaya, Odisha, Jammu and Kashmir, Chhattisgarh and Arunachal Pradesh respectively during the year 2011. On the other hand, Human development Index Score was the highest in Kerala followed by Goa, Himachal Pradesh, Tamil Nadu, Maharashtra, Punjab, Haryana, West Bengal, Jammu and Kashmir and Gujarat respectively, whereas Uttar Pradesh was placed at the bottom preceded by Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Madhya Pradesh, Manipur, Jharkhand, Meghalaya and Nagaland respectively. On the basis of ranking in terms of Social Development, concerted efforts are needed in lagging states and Union Territories. This paper proposes a set of recommendations with regard to improving constraints on social development and human development in backward regions/states.

Keywords: Relative performance, Human development, Z-score, Socio-economic conditions

[1]Assistant Professor of Economics, Himachal Pradesh National Law University Shimla
Email: harryhcv@gmail.com,

[2]Additional Controller of Examinations, Himachal Pradesh University Shimla
Email:draktiwarihpu@gmail.com

[3]Professor of Economics, Department of Evening Studies, HPU, Shimla

Introduction

Regional disparities have continued attracting the attention at least since Rudyard Kipling wrote that "East is East and West is West and never the twain shall meet", as the statement is equally relevant for economic differences.

The theme of regional disparities has been well-researched both theoretically and empirically and has led to coining of many attractive terms like 'centres', 'peripherals', 'backwash effects', 'spread effects', 'disadvantaged regions', 'advantages of early start', 'latecomers', 'convergence', 'polarisation', 'bridging the gap', 'gap widening', 'convergence hypothesis' and 'catching-up hypothesis', etc. The neo-classical growth model states that per-capita growth rate tends to be inversely related to the starting level of output or income per person in an economy. Thus, poor regions or economies have a tendency to grow faster than richer ones and this tendency was taken to be promoting convergence. It has been well understood by now that due to low base, even when the growth rates of backward regions are higher, the absolute gap is not likely to reduce and may in fact widen. For bridging of gap, the required condition for advanced (A) and backward (B) regions is as under:

$$\frac{rB}{rA} > \frac{PCYA}{PCYB}$$

i.e.the ratio of the growth rates of backward region to advanced region should be higher than the ratio of their per capita incomes. Thus, if the per-capita incomes differ by ten times, the growth rate in backward region has to be more than ten times higher for bridging of the absolute gap, which is a distant dream.

There may be a remote possibility of bridging of the gap within the categories of 'rich', 'middle level', or 'low level' groups of countries/regions, but bridging of the gap between advanced and backward countries/regions is rather impossible, unless the advanced countries start experiencing zero or negative growth rates.

The failure of the 'trickle-down effect' not only in case of poor sections of the society but also in case of poor regions has led to widening of personal and regional inequalities within a country (or state). Regional problem does not necessarily relate to problem regions only, there may be backward pockets even within an advanced country/state/region, thereby indicating that regional policies are equally relevant for both advanced and backward regions.

There is need of proper diagnosis of regional disparities, because it is pre-requisite for appropriate policies. If migration is the cause of regional imbalances, then the strategy for regional development may involve 'taking the work to the workers' rather than 'taking workers to work' to handle the problem of migration. The problems, complexities and dilemmas are inherent in the regional policies in view of the conflicting objectives and the task is formidable

though not insurmountable. In most of the cases the disparities between more prosperous and less prosperous regions have not reduced despite vigorous policies. However, it does not necessarily reflect the failure of regional policies because in the absence of such policies the disparities might have been larger.

Liberalisation and globalisation of the economies do not reduce the importance of regional policies and strategies. Only the emphasis may shift from direct participation to market friendly policies for formulation of development plans and programmes. Concerted efforts are needed for consistent and coherent programmes for balanced regional development. Thus, regional policies are not only going to stay, but need to be improved, strengthened and made more effective.

The present study is an endeavour to analyse comparatively inter-state social sector development and human development in India based on secondary source of data for the census year 2011. Major indicators of social sector development and human development comprising of health, education, income, labour force participation rate, demography, poverty and safe drinking water etc. have been selected for the purpose of the study. In the present study, 34 indicators related to social sector development have been taken, whereas 3 indicators relating to human development have been taken.

Objective of the Study

The present study is an endeavour to analyse comparatively inter-state social sector development and human development in India thus focusing on inter-state disparities in the levels of development. The specific objectives of the study are:

1. To rank the states according to their levels of social sector development and human development in India on the basis of a development index and human development index.
2. To identify backward states which could be helpful in formulating regional policies for achieving the objective of balanced regional development.

Methodology

Development Index for the Measurement of Level of Development

In order to construct indices whose values can range between 0 and 1, the minimum and maximum admissible values—also known as lower and upper bounds—must first be determined. However, in order to reduce the impact of extreme outliers on the distribution of index values, the bounds may be set higher (or lower) than the actual minimum (or maximum) value of the indicator's data set as the case may deem fit.

The basic formula for converting an indicator value into an index score is:

$$\text{Development Index} = \frac{\text{Actual Value} - \text{Maximum Value}}{\text{Maximum Value} - \text{Minimum Value}}$$

Where, minimum value is the minimum admissible value (lower bound) and, maximum value is the maximum admissible value (upper bound).

For indices with indicator values below (above) the lower (upper) bound, the actual indicator value is replaced with the lower (upper) bound resulting in an index score of 0 (100). In a few cases, indicator and criteria point in opposite directions. For example, a high infant mortality rate signifies a low (rather than high) level of development. In these cases, the following alternative formula is used:

$$\text{Development Index} = \frac{\text{Maximum Value} - \text{Actual Value}}{\text{Maximum Value} - \text{Minimum Value}}$$

The Development Index ranges between 1, denoting maximum development, to 0 representing no development. It measures the relative development level of various regions in relation to the most developed one. This measures the extent to which a particular region is lagging behind as compared to the one at the top.

Correlation for the Measure of Absolute and Relative Relationship

Correlation is a statistical tool that helps to measure and analyse the degree or extent to which two or more variables fluctuate with reference to one another. In other words, if the change in one variable affects a change in the other variable, the variables are said to be correlated. Thus, correlation denotes the inter-dependence among the variables. For correlating two phenomena, it is essential that the two phenomena should have a cause-effect relationship and if such relationship does not exist, then the two phenomena cannot be correlated. The degree of relationship is expressed by a coefficient which ranges from -1 to +1. The direction of change is indicated by a negative or positive sign. Here Spearman's Rank Correlation Coefficient has been used to study correlation in the present study.

Spearman's Rank Correlation Coefficient: This method is especially useful when quantitative measure of certain factors involving quantity or quality cannot be fixed. Cases involving the evaluation of leadership skills and ability of an individual or the judgment of female beauty and the like may make use of this method.

Spearman's Rank correlation coefficient is given by:

$$r = 1 - \left(\frac{6\Sigma d^2}{n(n^2-1)}\right)$$

r = Where, r = Rank coefficient of correlation d = Difference of ranks between paired item in two series n = Total number of observations Interpretation of Rank Correlation Coefficient: The value of rank correlation coefficient, r ranges from -1 to +1. If r = +1, then there is complete agreement in the order of the ranks and the ranks are in the same direction. If r = -1, then there is complete agreement in the order of the ranks and the ranks are in the opposite direction. If r = 0, then there is no correlation

In order to standardise the indicators Z-Sum technique has been used having zero mean value and unit standard deviation. Z-scores have been calculated as follows:

$$Z = \frac{Xij - \bar{X}i}{Si}$$

Where i refers to the indicators (i=1, 2, 3…n) and j refers to the State (j=1,2,3…n)

$\bar{X}i$ refers to mean value of i^{th} indicator and *Si* is the Standard Deviation

Reverse Coding

For most of the measures, a higher Z-score score indicates poorer health (e.g., high infant mortality rate). However, for some of our measures (e.g., high life expectancy) a higher score indicates better health or a more desirable value. We have to take these indicators into account before computing summary scores, so that higher scores indicate poorer health or development. For these measures we compute the Z-score as:

$$Z = \frac{\bar{X}i - Xij}{Si}$$

The measures that we reverse code in this manner are:

- Crude Birth Rate
- Crude Birth Rate (Rural)
- Crude Birth Rate (Urban)
- Crude Death Rate
- Crude Death Rate (Rural)
- Crude Death Rate (Urban)
- Infant Mortality Rate
- Infant Mortality Rate (Rural)
- Infant Mortality Rate (Urban)

- Total Fertility Rate
- Total Fertility Rate (Rural)
- Total Fertility Rate (Urban)
- Persons Per 100 Households
- Persons Per 100 Households (Rural)
- Persons Per 100 Households (Urban)
- Density of Population
- Percentage of Rural Population to Total Population
- Percentage of People Living below Poverty Line

Results and Discussions

The analysis drawn from the development index is as follows:

In order to find the level of social sector development in India, an effort has been made to calculate the development index by summing up the values of deprivation score. Accordingly, the states have been ranked on the basis of values of development index. It is evident from the Table 1.1 that the development index score for the year 2011 was highest in Andaman and Nicobar Islands followed by Tripura, Sikkim. Tamil Nadu, Himachal Pradesh, Mizoram, Goa, Puducherry, Chandigarh and Kerala respectively, whereas Bihar was placed at the bottom place preceded by Uttar Pradesh, Madhya Pradesh, Rajasthan, Jharkhand, Assam, Haryana, Meghalaya, Odisha, Jammu and Kashmir, Chhattisgarh and Arunachal Pradesh respectively during the year 2011. On the other hand,Human development Index Score was the highest in Kerala followed by Goa, Himachal Pradesh, Tamil Nadu, Maharashtra, Punjab, Haryana, West Bengal, Jammu and Kashmir and Gujarat respectively, whereas Uttar Pradesh was placed at the bottom preceded by Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Madhya Pradesh, Manipur, Jharkhand, Meghalaya and Nagaland respectively.

Alternatively, in order to calculate the composite index of social sector development in India, an effort has been made to calculate the composite index of development by summing up the values of Z-Score. Accordingly, the states have been ranked on the basis of values composite index. It is evident from Table 1.2 that the Z-Score for the year 2011 was highest in Uttar Pradesh followed by Chhattisgarh, Madhya Pradesh, Gujarat, Rajasthan, Odisha, Karnataka, Assam, Meghalaya and Tamil Nadu respectively, whereas Manipur was placed at the bottom place preceded by Chandigarh, Arunachal Pradesh, Delhi, Goa, Nagaland, Andaman and Nicobar Islands, Tripura, Lakshadweep, Daman and Diu and Jammu and Kashmir respectively during the year 2011. On the other hand,

Human development Index Score was the highest in Kerala followed by Goa, Himachal Pradesh, Tamil Nadu, Maharashtra, Punjab, Haryana, West Bengal, Jammu and Kashmir and Gujarat respectively, whereas Uttar Pradesh was placed at the bottom preceded by Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Madhya Pradesh, Manipur, Jharkhand, Meghalaya and Nagaland respectively.

Both the methods, by and large, have given similar results which is evident from the ranking pattern of the states, already explained in the above discussions.

Conclusions and Suggestions

The basic idea behind undertaking the present study was to analyse state-wise spatial dimensions of social development in India for the year 2011 (latest census year). The main objective of the study was to examine as to what extent the revised strategy of development of *Bottom-up Approach* adopted during eighties and nineties has gone in favour of bringing about improvement in balanced state-wise pattern of social development as against the previous strategy based on *Top-down Approach.*

Social sector which comprises mainly education and health services is considered as a key factor in socio-economic development. According to the value of development indices, Andaman and Nicobar Islands followed by Tripura, Sikkim. Tamil Nadu, Himachal Pradesh, Mizoram, Goa, Puducherry, Chandigarh and Kerala respectively have emerged as developed category states, whereas Bihar, Uttar Pradesh, Madhya Pradesh, Rajasthan, Jharkhand, Assam, Haryana, Meghalaya, Odisha, Jammu and Kashmir, Chhattisgarh and Arunachal Pradesh are backward states in respect of social development.

With a view to promoting social development in less developed (backward) states, it would be imperative to undertake a well-designed programme for developing this sector on a priority basis. Macro picture of social development shows that in various aspects of social development, developed states have achieved remarkable success. In order to sustain its social status, it is imperative to give special attention to the less developed states particularly for increasing female literacy and urbanisation.

From the planning perspective, and on the basis of present analysis, the states, which have experienced low level of development in any sector of socio-economic development, should be given first priority in the process for implementing the developmental plans. But, the states attaining the high levels of development should not be ignored in the matter of the implementation of developmental plans i.e. the natural pace of development should not be slowed down any more but should not also be given top priority in comparison to that in retarded states. It is important that the development gap prevailing between the

retarded and the developed states, should be systematically and judiciously alleviated in order to achieve an optimal spatial socio-economic development,

References

Alexander, W. M. (1994) “Humans sharing the bounty of the Earth: hopeful lessons from Kerala”, *Proceedings of the International Congress on Kerala Studies, Kerala, India*, Aug. 27-29, 1994

Anant, T.C.A., K.L. Krishna and Uma Roy Chaudhry (1994), “Measuring Inter State Differentials in Infrastructure”, *Centre for Development Economics*, Delhi School of Economics, University of Delhi.

Bagchi, Amaresh (2007), “Role of Planning and Planning Commission in The New Indian Economy: Case for a Review”, *Economic and Political Weekly*, Vol. XLII, No. 44, 3 November, p. 92.

Basiago, A. D. (1994) “Sustainable development in tropical forest ecosystems”, *The International Journal of Sustainable Development and World Ecology*, 1(1), 34-40.

Basiago, A. D. (1995) Methods of defining ‘sustainability’ Sustainable Development, 33, 109-119.

Chand, Hari (2019), “Social Sector Development in India under Plans: An Analysis on the Basis of Planned Expenditure”, *Online International Interdisciplinary Research Journal*, Volume-09, July 2019 Special Issue, pp. 102-128.

Chand, Hari (2018), “Social Sector Development in India: A Disaggregated Study”, *Trisha Journal of Educational Research*, Vol. 4, No. 1, pp. 52-64.

Dash, T.R. (1993), “Regional Inequalities in Educational Development in Orissa”, *The Indian Economic Journal*, Vol. 25 No. 1, pp 19-29.

Dholakia, Ravindra (2003), "Regional Disparity in Economic and Human development in India", *Economic and Political Weekly*, Vo1.38, No. 39, pp. 3915- 3930.

Demetriades, P.O. and T.P. Mamuneas (2000), “Inter-temporal Output and Employment Effects on Public Infrastructure Capital: Evidence from 12 OECD Countries”, *The Economic Journal*, Vol. 110, No. 465 (Jul., 2000), pp. 687-71.

Desai, S.A. (1976): “Determinants of Inter-State Government Expenditure Differentials in India”, Indian Journal of Economics, Vol. LVI, No.3, pp. 435-42.

Dev, S. Mahindra and C. Ravi (2007): ‘Poverty and Inequality: All India and States, 1983-2005,*Economic and Political Weekly*, Vol. XLII, No. 6, January 10, p. 509.

Dholakia, Ravindra (2003), "Regional Disparity in Economic and Human development in India", *Economic and Political Weekly*, Vo1.38, No. 39, pp. 3915- 3930.

Diwakar, D.M. (2009), “Intra-regional disparities, Inequality and Poverty in Uttar Pradesh”, *Economic and Political Weekly*, Vol. XLIV, Nos. 26 & 27, 27 June, p. 264.

Ghosh, B. and Den Prabir (1998), “The Role of Infrastructure in Regional development: A Study over The Plan Period”, *Economic and Political Weekly*, Vol. 33, No. 47-48, November, pp. 3039-3048.

Gibson, RB (2006): Beyond the pillars: sustainability assessment as a framework for effective integration of social, economic and ecological considerations in significant decision-making. J Environ Assess Pol Manage 8(3):259–280.

Himani (2003), “Environmental Conservation & Sustainable Development Policy, Analysis and Administration”, *Anamika Publishers*, New Delhi.

Joshi, Deepali Pant (2008) “Poverty and Sustainable Development", *Gyan Publishing House*, New Delhi.

Kurian N J (2007) Widening economic and social disparity: Implication for India. *Indian J Med Res*. 374–80.

Shukla, Amitabh (2000), "Regional Planning and Sustainable Development", *Kanishka Publishers*, New Delhi.

Tiwari, A. K. (2000). Infrastructure and Economic Development in Himachal Pradesh, *Indus Publishing House*, New Delhi.

Tiwari, A. K. (2002). “Inter-District Disparities in the Economic Development of Himachal Pradesh”, *Nava Arthiki*, Vol. 10, No. 2 (July-December).

Tiwad, A, K. (2005). “Feel Good and Bad Factors in Infrastructure Sector of Himalaya Hill’s Economy of India” in S. Murty (ed.), *Feel Good and Bad Factors in Different Sectors*, RBSA Publishers, Jaipur.

Tiwari, A. K. (2007). Spatial Dimensions of Socio-Economic Development in Himachal Pradesh, *Kanishka Publications*, New Delhi.

Tiwari, A.K. (2010), “Infrastructure for Sustainable Rural Development”, *Regal Publication*, New Delhi.

Tiwari, R.T. (1984), “Changing Pattern of Development in India”, *Ashish Publishing House*, New Delhi.

United Nations (1987) Report of the World Commission on Environment and

Development. *General Assembly Resolution* 42/187, Dec 11.

World Bank. (1997), "State in a Changing World", *World Development Report*, Oxford University Press.

Weicher, J.C. (1970), “Determinants of Central City Expenditures: Some Overlooked Factors and Problems”, *National Tax Journal*, Vol. XX111, pp. 379-94.

Zahir, Mohammed (1972), “Public Expenditure and Income Distribution in India”, *Associated Publishing House*, New Delhi.

Table-1.1
Rank of States Based on the Value of Development Index and Human Development

State	Development Index for the Year-2011	Rank	Human Development Index for the Year 2011	Rank
Andhra Pradesh	0.594	17	0.309	17
Arunachal Pradesh	0.487	25	0.124	27
Assam	0.405	30	0.138	26
Bihar	0.289	35	0.158	25
Chhattisgarh	0.487	26	0.18	24
Delhi	0.597	16		
Goa	0.694	7	0.803	2
Gujarat	0.540	22	0.477	10
Haryana	0.455	29	0.493	7
Himachal Pradesh	0.699	5	0.647	3
Jammu & Kashmir	0.498	24	0.479	9
Jharkhand	0.379	31	0.222	21
Karnataka	0.588	19	0.42	12
Kerala	0.677	10	0.911	1
Madhya Pradesh	0.364	33	0.186	23
Maharashtra	0.640	13	0.629	5
Manipur	0.614	15	0.199	22
Meghalaya	0.464	28	0.246	20
Mizoram	0.699	6	0.408	13
Nagaland	0.620	14	0.257	19
Odisha	0.485	27	0.261	18
Punjab	0.593	18	0.538	6
Rajasthan	0.377	32	0.324	15
Sikkim	0.722	3	0.324	16
Tamil Nadu	0.702	4	0.633	4
Tripura	0.730	2	0.354	14
Uttar Pradesh	0.302	34	0.122	28
Uttarakhand	0.552	21	0.426	11
West Bengal	0.641	12	0.483	8
A& N Islands	0.777	1		
Chandigarh	0.680	9		
D&N Haveli	0.512	23		
Daman & Diu	0.657	11		
Lakshadweep	0.581	20		
Puducherry	0.689	8		

Source: Primary Probe

Table-1.2
State-wise Z-Score and Human Development Index for the Year 2011

States	Z-Score Index for the Year-2011	Rank	Human Development Index for the Year 2011	Rank
Andhra Pradesh	41.35	15	0.309	17
Arunachal Pradesh	28.77	24	0.124	27
Assam	16.54	30	0.138	26
Bihar	0.00	35	0.158	25
Chhattisgarh	27.76	25	0.18	24
Delhi	38.98	19		
Goa	52.73	7	0.803	2
Gujarat	34.25	22	0.477	10
Haryana	22.02	29	0.493	7
Himachal Pradesh	55.20	5	0.647	3
Jammu & Kashmir	27.74	26	0.479	9
Jharkhand	12.96	31	0.222	21
Karnataka	40.76	17	0.42	12
Kerala	51.78	9	0.911	1
Madhya Pradesh	11.31	33	0.186	23
Maharashtra	46.99	13	0.629	5
Manipur	42.45	14	0.199	22
Meghalaya	24.33	28	0.246	20
Mizoram	53.94	6	0.408	13
Nagaland	40.93	16	0.257	19
Odisha	27.54	27	0.261	18
Punjab	40.57	18	0.538	6
Rajasthan	12.27	32	0.324	15
Sikkim	56.92	3	0.324	16
Tamil Nadu	55.70	4	0.633	4
Tripura	58.04	2	0.354	14
Uttar Pradesh	2.38	34	0.122	28
Uttarakhand	34.40	21	0.426	11
West Bengal	47.46	11	0.483	8
A & N Islands	63.54	1		
Chandigarh	49.87	10		
D&N Haveli	29.59	23		
Daman & Diu	47.10	12		
Lakshadweep	37.84	20		
Puducherry	52.38	8		

Source: Primary Probe

List of Indicators of Social Development

A1	Life Expectancy at Birth
A2	Crude Birth Rate
A3	Crude Birth Rate (Rural)
A4	Crude Birth Rate (Urban)
A5	Crude Death Rate
A6	Crude Death Rate (Rural)
A7	Crude Death Rate (Urban)
A8	Infant Mortality Rate
A9	Infant Mortality Rate (Rural)
A10	Infant Mortality Rate (Urban)
A11	Total Fertility Rate
A12	Total Fertility Rate (Rural)
A13	Total Fertility Rate (Urban)
A14	Overall Sex Ratio
A15	Sex Ratio in the Age-group of 0-6 years
A16	Persons Per 100 Households
A17	Persons Per 100 Households (Rural)
A18	Persons Per 100 Households (Urban)
A19	Density of Population
A20	Percentage of Rural Population to Total Population
A21	Percentage of Urban Population to Total Population
A22	Overall Literacy Rate
A23	Total Male Literacy Rate
A24	Total Female Literacy Rate
A25	Percentage of People Living below Poverty Line
A26	Labour Force Participation Rate (Rural Male)
A27	Labour Force Participation Rate (Rural Female)
A28	Labour Force Participation Rate (Rural Overall)
A29	Labour Force Participation Rate (Urban Male)
A30	Labour Force Participation Rate (Urban Female)
A31	Labour Force Participation Rate (Urban Overall)
A32	Household Access to Safe Drinking Water (Total)
A33	Household Access to Safe Drinking Water (Rural)
A34	Household Access to Safe Drinking Water (Urban)

List of Indicators of Human development

H1	Life Expectancy at Birth
H2	Gross Enrolment Ratio
H3	GDP Per Capita

Man & Development
Vol. XLIII No. 4, December 2021,
http://www.crrid.res.in/journal/
ISSN 0258-0438

SOCIO-ECONOMIC IMPLICATIONS OF LAND ACQUIRED FOR THERMAL POWER PROJECTS: A CASE STUDY OF NABHA THERMAL POWER PLANT IN RAJPURA, PUNJAB

Mandeep Singh Gill[1]

Abstract: This study is based on the socio-economic implications of land acquisition in the 7 villages where non-residential land and agricultural land was acquired to set up the Nabha Thermal Power Plant in Rajpura. Survey was done using proportionate random sampling. The pre-acquisition status and post- acquisition status of project affected families along with the problems being faced by the villagers during the process of acquisition and after setting up of the plant have been assessed. The purpose of the present paper is find out the ground reality of the actual processes that were followed for acquiring land by the Punjab Government by invoking the Land Acquisition Act of 1894.

Keywords: Land acquisition, Utilisation of compensation, Landholding size.

Introduction

Nabha Power Limited (NPL) was established as a Special Purpose Vehicle (SPV) by the erstwhile Punjab State Electricity Board (PSEB) to develop the Rajpura Thermal Power Project at a site near village Nilas, District Patiala, Punjab. NPL signed Power Purchase Agreement on January 18, 2010 with PSEB and the ownership of NPL was also transferred to Larsen & Toubro Power Development Limited. The thermal power plant started commercial operations on January 30, 2014. The location of the plant is 8.80 kilometers away from Chandigarh-Rajpura road.

Approximately, 485.83 hectares (1200 acres) of land was acquired in 2008 for setting up the plant and laying down roads and railway line. Out of the 15 villages affected from the project, land was acquired from 7 villages

[1] Ph.D. Research Scholar, Centre for Research in Rural and Industrial Development (CRRID), Chandigarh.
E-mail- gillmandeep2820@yahoo.com

(Sural Kalan, Sural Khurd, Nilas Khurd, Sadhraur, Nilas Kalan, Rai Majra and Rangian) for setting up of the plant and from 8 villages (Mirzapur, Harna, Jeonpura, Cholti Khedi, Chandu Majra, Jansui, Basantpur and Kotla) for laying down roads and railway line. Potential affected population is estimated at 5000. Rs. 37,05,000 per acre compensation money was given to the project affected families. Compensation money was also paid separately for tube wells, trees and storage houses which came in the acquired land. So far as employment is concerned, despite promises made by the authorities, most of the labourers and other employees have been hired from outside the state. The locals claim that the government purchased their land at a very low price and most of the farmers are unhappy. Some villagers feel that all their land should have been acquired because it became economically unviable to do cultivation on the leftover small portion of land. The land acquired was also owned by people who had been earlier displaced during the Partition and now were again disturbed due to setting up of this plant. The 'Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013', while overcoming the weaknesses of the old act has made changes in relation to quantum of consent required, process for determining compensation, preliminary investigation for preparation of Social Impact Assessment (SIA) study and the appraisal of the same by and expert group (EG) among others.

Objectives

- To examine the socio-economic impact of land acquisition on project affected families.
- To study how the compensation amount is utilised by the project affected families.
- To examine the effect of land acquisition on landless farmers.

Hypotheses

- Land acquisition does not lead to problems such as unemployment and displacement among affected households.
- Land acquisition does not adversely impact the income levels of the affected households.

Methodology

To find out the number of villages affected by this project, a meeting with the General Manager of the Nabha Thermal Power Plant and after that an informal group discussion with the residents of a nearby affected village was done. Data on the village-wise area acquired and the number of project affected families were taken from the SDM Office, Rajpura. Respondents were selected on the basis of proportionate random sampling to get a representative picture with the

objective of assessing pre-acquisition status and post-acquisition status of project affected families and change in their economic and social well-being. Attempt was made to cover representative families of various categories in the survey. Out of the total land acquired, 270.27 hectares of land was owned by 154 individual households and out of these 50 families were surveyed by way of specially designed questionnaires. As 166.23 hectares of land acquired was common, a detailed discussion with the gram panchayats and residents was done to elicit their views regarding the impact. Two questionnaires were framed: one for Panchayat and another for individual landowners. Secondary data were taken from the District Handbook of Patiala to get the socio-economic profile of the villages which includes: total area of the village, cultivated and irrigated land, caste-wise population and number of households. Farmers have been categorised into five types of operational holdings: marginal farmer (upto 1 hectare), small farmer (1-2 hectares), semi-medium farmer (2-4 hectares), medium farmer (4-10 hectares) and large farmer (10 hectares and above). Environmental impact is not studied because it doesn't come under the purview of this study, though it is the basic concern of the people when a thermal power plant operates.

Analysis of Data

In this paper, attempt has been made to analyse both primary and secondary data.

A. Analysis based on Secondary data

Table-1
Social Composition of Population across the Affected Villages

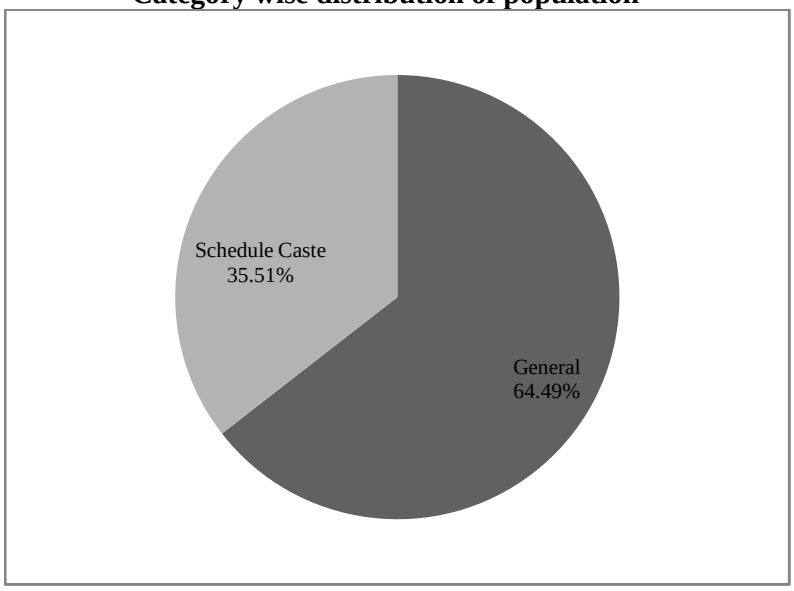
S. No.	Village	Number of Households	Population	General (%)	SC (%)
1	Sural Kalan	230	1592	20.79	79.21
2	Sural Khurd	55	331	92.15	7.85
3	Nilas Khurd	148	930	84.95	15.05
4	Sadhraur	131	774	53.23	46.77
5	Nilas Kalan	181	1253	89.31	10.69
6	Rai Majra	19	121	100.00	0.00
7	Rangian	95	625	88.00	12.00
	Total	859	5626	64.49	35.51

Source: District Handbook of Patiala (2001)

Table 1 shows the social composition of the population residing in these villages. The number of households varies from 19 in Rai Majra to maximum of 230 in Sural Kalan. Sural Kalan has the highest population at 1592 people and is the

only village where majority of the population(79.21%) is from the Schedule Caste category. The second highest population is in Nilas Kalan where out of 1253 people 89.31 per cent are from the General category. Population in the general category varies from as high as 100 per cent in Rai Majra to 20.79 per cent in Sural Kalan. According to the 2011 Census of India, the SC population, in Punjab, is 31.94 per cent of the total population of the state and in these villages it is 35.51 per cent, though, it varies significantly from one village to another. Figure 1 show the social composition of the sampled households. 64.49 per cent are from the general category and 35.51 per cent are from the schedule caste category.

Figure-1
Category wise distribution of population



Source: District Handbook of Patiala (2001)

Table 2 gives the geographical area of each village prior to acquisition and the total land acquired for the project. The project has been set up on 436.50 hectares (1078.16 acres) of land after acquiring 29.69 per cent of the total geographical area(1470 hectares) of these 7 villages. The land acquired for this plant consists of 61.92 per cent individually owned land and 38.08 per cent commonly owned land. In terms of individual ownership of land, 101.72 hectares (highest) from Sural Khurd and 0.33 hectares (lowest) from Nilas Kalan were acquired. In terms of common ownership of land, 75.68 hectares (highest) were acquired from Sural Kalan and 0.48 hectares (lowest) were acquired from Rai Majra.

Table-2
Area of land acquired classified by villages (in hectares)

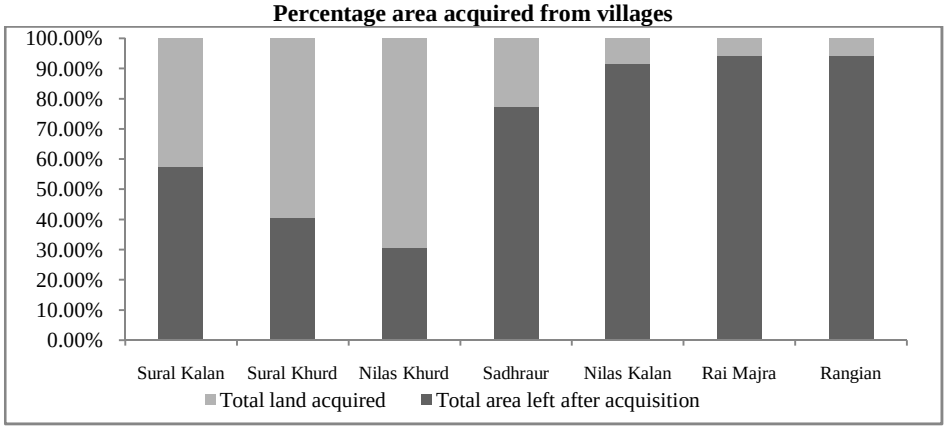
S. No.	Village	Total Geographical Area (in 2007)	Land acquired		Total land acquired
			Individually owned land	Panchayat's land	
1	Sural Kalan	316	58.22	75.68	133.90 (42.37)
2	Sural Khurd	183	101.72	6.96	108.68 (59.38)
3	Nilas Khurd	127	29.87	58.1	87.97 (69.26)
4	Sadhraur	307	63.28	6.8	70.08 (22.82)
5	Nilas Kalan	184	0.33	15.38	15.71 (8.53)
6	Rai Majra	186	10.04	0.48	10.52 (5.65)
7	Rangian	167	6.81	2.83	9.64 (5.77)
	Total	1470	270.27	166.23	436.50 (29.69)

Source: Archives, SDM Office, Rajpura (2009).
Note: Figures in brackets are percentages.
Primary Survey, 2014.

As Figure 2 shows, Nilas Khurd lost 69.26 per cent of its total geographical area and Sural Khurd lost almost 59.38 per cent of its land. Nilas Kalan, Rangian and Rai Majra lost less than 10 per cent of their area.

Since 38.08 per cent of the acquired land was the panchayat's, it is important to find out the post-acquisition area of panchayat under cultivation.

Figure-2
Percentage area acquired from villages



Source: Archives, SDM Office, Rajpura (2009).
Primary survey, 2014.

Table 3 shows that prior to acquisition, more than 89 per cent of the land was cultivated in every village. In 4 out of 7 villages, more than 60 per cent of the

land was acquired and, as a result, the area under cultivation in these villages dropped significantly. The cultivated area after acquisition dropped in Nilas Khurd from 65.71 hectares to 7.64 hectares and in Sural Kalan from 126 hectares to 50.32 hectares. 100 per cent of Nilas Kalan's land was acquired.

Table-3
Change in Panchayat's Area under Cultivation classified by Villages (in hectares)

S. No.	Village	Panchayat's area (in 2007)	Area cultivated (pre-acquisition)	Area of land acquired	Panchayat's area (in 2010)	Area cultivated (post-acquisition)
1	Sural Kalan	130	126	75.68	54.32	50.32
			(96.92)	(60.06)		(39.94)
2	Sural Khurd	10.12	9.1	6.96	3.34	2.15
			(89.92)	(76.48)		(23.52)
3	Nilas Khurd	73.75	65.71	58.07	15.68	7.64
			(89.09)	(88.37)		(11.67)
4	Sadhraur	46.56	42.1	6.8	39.76	35.29
			(90.42)	(16.15)		(83.85)
5	Nilas Kalan	15.38	15.38	15.38	0	0
			(100)	(100.00)		(0.00)
6	Rai Majra	25.91	25	0.48	25.43	24.52
			(96.48)	(1.92)		(98.08)
7	Rangian	11.74	10.93	2.83	8.91	8.09
			(93.10)	(25.89)		(74.11)

Source: SDM Office, Rajpura
Note: Figures in brackets are percentages.
Primary survey, 2014

Table-4
Percentage Distribution of Project Affected Families classified by Landownership Status

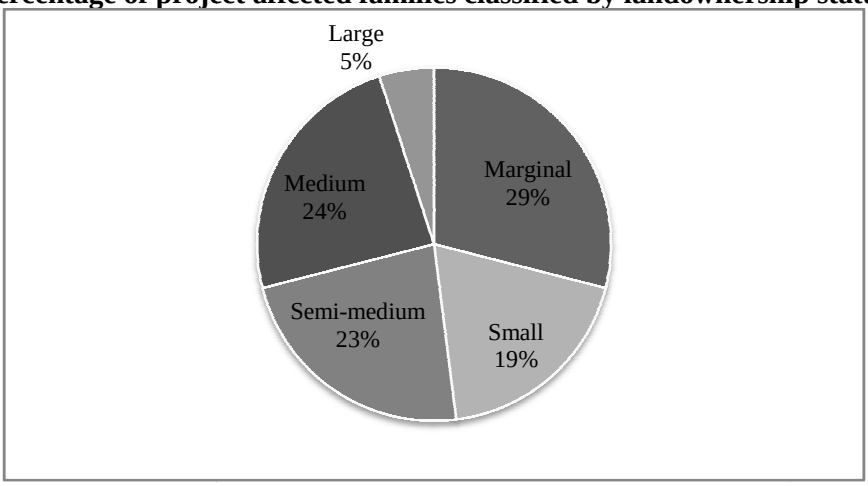
S. No.	Village	Project Affected Families (N)	Marginal	Small	Semi-medium	Medium	Large
1	Sural Kalan	53	45.28	22.64	11.32	20.75	0.00
2	Sural Khurd	19	15.79	15.79	5.26	42.11	21.05
3	Nilas Khurd	25	24.00	32.00	36.00	4.00	4.00
4	Sadhraur	43	23.26	11.63	25.58	32.56	6.98
5	Nilas Kalan	1	0.00	0.00	0.00	100.00	0.00
6	Rai Majra	11	9.09	18.18	72.73	0.00	0.00
7	Rangian	2	0.00	0.00	0.00	100.00	0.00
	Total	154	29.00	19.00	23.00	24.00	5.00

Source: SDM Office, Rajpura. (2008)

Table 4 shows that there are 154 households whose individually owned land was acquired. The maximum number of households who were affected by this acquisition is from Sural Kalan(53) followed by Sadhraur(43), while just one household from Nilas Kalan was affected. It is the marginal farmer and small farmer who got the most affected from this acquisition. In three villages, more than 3/4th of the affected households owned upto 4 hectares. There are no marginal, small and semi-medium farmers in two villages, Nilas Kalan and Rangian, where only three households, who are in the medium category, got affected. The percentage of affected marginal farmers varies from 0 per cent in Rai Majra and Nilas Kalan to 45.28 per cent in Sural Kalan.

On categorising the landowners on the basis of their individually owned land into 5 size groups, 29 per cent belonged to the marginal category. As the data in Figure 3 show, the affected households comprise of 58 per cent people who owned up to two hectares, 47 per cent who owned up to 10 hectares and just 5 per cent who owned more than 10 hectares of land.

Figure-3
Percentage of project affected families classified by landownership status



Source: SDM Office, Rajpura. (2008)
Primary survey, 2014.

B. Analysis based on Primary data

Table 5 shows the number of households who have been affected by the acquisition of panchayat's land. The total number of affected households is the sum of the total affected farmers who owned land individually and the total number agricultural labourers or landless families who were solely dependent on the Panchayat's land for their livelihood. The total land of Nilas Kalan and 88.37 per cent of Nilas Khurd's Panchayat's land was acquired. In a focus group discussion with the affected families of these 2 villages, it was found out that this

had a direct impact on the livelihoods of 200 families from both the villages. Thirtyfive landless households of Nilas Kalan got unemployed. Women, who looked after the dairy farming business and collected fodder, went completely out of work. After acquisition, the dairy farming business was shut down and animals were sold out, thereby reducing the incomes of the families dependent solely on the Panchayat's land. Six villages were selected for the sample. Out of 678 households living in these 6 villages, 57.66 per cent households were affected from acquisition of panchayat's land. In Sural Kalan, 78.26 per cent households out of the total 230 households were affected. The total number of affected households varies from 4 in Rai Majra to 180 in Sural Kalan. The number of landless households who got affected varies from 2, in Rai Majra, to 32, in Sadhraur, where no farmer households leased-in land from the panchayat.

Table-5
Project Affected Families dependent on Panchayat's land

S. No.	Village	Total number of Households	Total number of Affected Households [(i)+(ii)]	Affected Farmer Households (i)	Affected Agricultural Labour Households (ii)
1	Sural Kalan	230	180	160	20
2	Sural Khurd	55	31	25	6
3	Nilas Khurd	148	130	115	15
4	Sadhraur	131	32	0	32
5	Rai Majra	19	4	2	2
6	Rangian	95	14	11	3
	Total	678	391	313	78

Source: SDM Office, Rajpura. (2008)
Primary survey, 2014.

Table-6
Percentage distribution of sampled households whose land was acquired

S. No.	Village	Number of families(n)	Marginal	Small	Semi-medium	Medium	Large
1	Sural Kalan	17	47.06	23.53	11.76	17.65	0.00
2	Sural Khurd	7	14.29	14.29	14.29	42.86	14.29
3	Nilas Khurd	10	20.00	30.00	30.00	10.00	10.00
4	Sadhraur	11	18.18	9.09	27.27	36.36	9.09
5	Rai Majra	4	25.00	25.00	50.00	0.00	0.00
6	Rangian	1	0.00	0.00	0.00	100.00	0.00
	Total	50	28.00	20.00	22.00	24.00	6.00

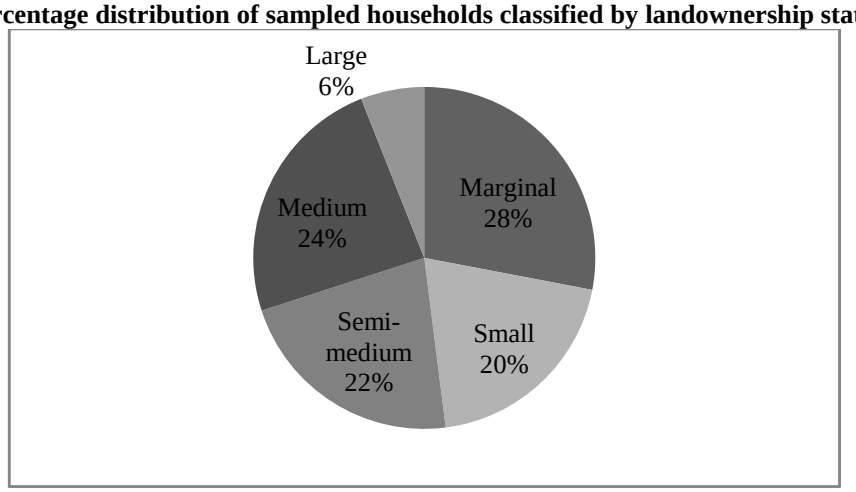
Source: Primary survey, 2014.

Table 6 shows the sample that was selected to undertake this study. Out of 154 households, 50 were selected as sample. The sample varied from 17 in

Sural Kalan (where almost 1/3rd of the total project affected families reside) to one in Rangian. In Nilas Kalan, survey was not done because only 1 household got affected.

Figure 4 shows that the sample consists of 48 per cent people who owned upto 2 hectares, 46 per cent who owned upto 10 hectares and 6 per cent who owned 10 hectares and above.

Figure-4
Percentage distribution of sampled households classified by landownership status



Source: Primary survey, 2014.

Utilisation of compensation money

All the families have utilised the compensation money in more ways than one and we have compiled the responses in Table 7. We have found 10 categories of expenditure made by the villagers: purchased agricultural land, construction or repair of house, purchased vehicles, purchased residential land, marriage, loan repayment, business investment, domestic consumption, bank deposit and education. There is not much difference in the expenditure pattern within villages, that's why category-wise distinction has been made. The data show that 70 per cent of the people have tried to compensate their loss of land. Buying land and constructing or repairing house are the only categories where more than 50 per cent have spent. Forty two per cent have spent on buying vehicles. The category of purchased vehicles only includes luxury items such as cars and motorcycles and not tractors or harvesters. The categories of purchasing vehicles and spending for marriage have been found to be linked to each other. There is a significant difference when it comes to spending on children's education, only 4 per cent of the people utilised the compensation money for this.

Table-7
Categories of expenditure

S. No.	Types of Expenditure	Number of people(out of 50)
1	Purchased agricultural land	35
2	Construction or repair of house	28
3	Purchased vehicles	21
4	Purchased residential plot	5
5	Marriage	5
6	Loan repayment	5
7	Business Investment	8
8	Domestic consumption	11
9	Bank deposit	11
10	Education	2

Source: Primary survey, 2014

Data in Table 8 show that, in all size categories, majority of people have spent their money on purchasing land. An important finding is that approximately 95 per cent respondents who purchased more land, preferred to do so within 100 kilometers of their villages. This shows that people were not ready to go far from their houses even when they got land at cheaper rates in other states. For the remaining 5 per cent stated that the only reason they bought land in another state was that they had some relatives who would look after their land. Second category of utilisation is the construction or repair of house. All categories except marginal farmers, more than 60 per cent of the respondents spent on the construction or repair of their houses with majority of them constructing new houses altogether. People have constructed 3-storeyed houses in the villages but some of them still haven't been able to construct boundary walls or get their houses painted. The marginal farmers have spent their money on repairing their houses because the amount they got was very less to construct a new house. Majority (66.67 %) of large farmers were enthusiastic about buying residential land but in all other categories, less than 40 per cent have done so. Respondents from only marginal and medium category have utilized the compensation money for the education of their children. Only marginal, small and semi-medium category respondents have used the money for repayment of their loans. Bank deposit is also a feature of almost all categories except large farmers. Even though most of the people thought that money-in-hand would get wasted in unnecessary expenditures, people have used money for domestic consumption. In this category, people have spent their money on buying electrical appliances and furniture for their houses. Though, people have intelligently utilised their money but some of them have spent their money on alcohol and drugs. As far as investment in business is concerned it should be noted that none of the HoH's were post graduates, 32 per cent were illiterate, 10 per cent have primary education and 12 per cent completed only middle school. This indicates that

children were put into farming at an early age. This is the reason why only 56 per cent of the HoH's had a skill to start another activity for a living. These skills include diploma degrees, computer courses and an occupation in manufacturing, repairs and services sector.

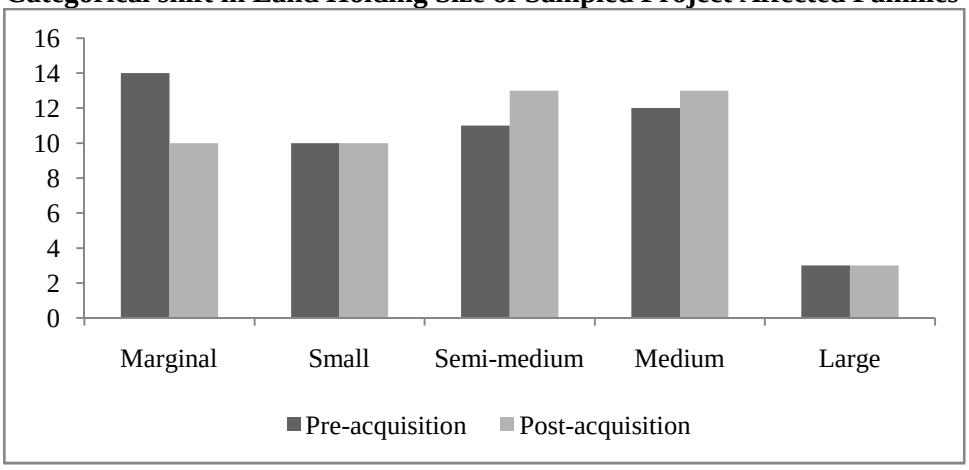
Table-8
Utilisation of compensation money categorised by operational holdings (in %)

S. No.	Category of Expenditure	Marginal	Small	Semi-medium	Medium	Large
1	Purchased land	71.43	60.00	81.82	58.33	100.00
2	Construction or repair of house	42.86	60.00	63.64	58.33	66.67
3	Purchased vehicles	14.29	60.00	36.36	66.67	33.33
4	Purchased plot	7.14	30.00	27.27	33.33	66.67
5	Marriage	7.14	40.00	27.27	16.67	0
6	Loan repayment	21.43	40.00	36.36	0	0
7	Business Investment	7.14	30.00	0	33.33	0
8	Domestic consumption	14.29	0	36.36	41.67	0
9	Bank deposit	14.29	0	36.36	41.67	0
10	Education	7.14	0	0	8.33	0

Source: Primary survey, 2104

Categorical Shift in Land Holding Size

Figure-5
Categorical shift in Land Holding Size of Sampled Project Affected Families



Source: Primary survey, 2014

Since we know the areas in which the compensation amount has been utilised by the sample households, we can show their categorical shift. From Figure 5, it's clear that respondents have reduced in the marginal category by 28.57 per cent. While the number of families in the small and large category is the same as before, people in the semi-medium and medium categories have increased by

18.18 per cent and 8.33 per cent. This clearly shows that farmers have been left better-off in terms of individually owned land. This result has proven good for some and bad for others. According to some people, land acquisition has left them better-off because with the money they received for their lands, they were able to buy land with higher productivity. But for others, looking after two far-off places at the same time is harassment for them.

Difficulties faced during construction stage

- Villagers were given promises of employment in the power plant but the company directly employed only highly skilled workers. Out of the sample, only 14 per cent of the respondents' family members were working in the plant as casual labourers on a daily-wage basis.
- Once the boundary wall came up, the flow of water was disrupted and as a result of standing water, crops were adversely affected which further worsened in the event of excessive rain. No system for proper drainage of water was setup.
- The site at which the plant has been constructed was used by the residents of Nilas village for grazing dairy animals. Women were actively involved in earning income. After acquisition, the dairy farming business completely finished, thereby, making 30-40 families unemployed directly which adversely affected milk production.
- Since the railway line is not accessible, coal is brought in through roads. The heavily loaded coal trucks have rendered the roads inaccessible.
- The project has employed people from other states and most of them are staying on rent in the villages. The strength has increased but resources such as electricity and water have not improved which are posing problems for the people in these villages.
- Other than air pollution, some potential environmental effects have reduced ecological/hydrological connectivity, increased food insecurity (crop damage) and noise pollution. It is because of these reasons that people in these villages think that they will have to move out in future if they want to avoid harmful diseases(example: cancer and birth defects in the Malwa belt, especially Bathinda) due to rise of uranium in water.
- On being asked why the villagers did not resettle elsewhere, they responded that it is difficult to adjust in a new society. Some sociological effects of this project are lack of occupational security, labour absenteeism, unemployment, loss of livelihood, land dispossession and loss of landscape/sense of place.
- Liqour shops have increased in the area from 2 to 10 after acquisition. This has led to increased alcohol consumption among men which is a common cause for family feuds.

Summary and Conclusion

Most people continued to remain economically dependent on agriculture but their economic status has deteriorated. Marginal farmers and women have not only lost their income but also social goods (liberty and opportunity). As far as utilization of compensation money is concerned, more than 2/3rd of the people purchased land. Other major forms of expenditure were constructing house and buying vehicles, whereas education was given importance by only 4 per cent of the people. Compensation according to the Land Acquisition Act, 1894, indemnifies the owner of the land and not the labourer, hence, landless families and agricultural labourers, who were dependent on the Panchayat's land, were the main losers in this acquisition because they did not receive any compensation and were deprived of their livelihood at the same time.

Land acquisition leads to displacement of people from their traditional occupations. Most project affected families who lack the skills required for industrial jobs are impoverished. Development has a hidden economic and social cost which is paid by the people residing near the project site. Some recommendations, important from policy point of view, to minimize these costs are: (i) marginal and small farmers whose entire landholdings are acquired must be given alternative employment, (ii) many agricultural labourers are dependent on the common land of the villages and because they don't have any other skills, there is a need to compensate them for their losses by giving them sufficient amount of money, and most importantly, (iii) project affected families should be made partners in development projects.

Acknowledgement

I would like to express special appreciation and thanks to Professor Ranjit Singh Ghuman, for his patient guidance, enthusiastic encouragement and useful critiques of this research work. I would also like to thank my Ph.D. supervisor, Dr. Sukhwinder Singh, for his useful comments which substantially helped to improve the paper. I also want to thank Mr. Haqiqat Singh, without whose supervision and constant help the research work would not have been possible.

Bibliography

Asthana,Vandana. (2012). 'Forced Displacement: A Gendered Analysis of the Tehri Dam Project', *Economic and Political Weekly*, vol. 47, no. 47/48, Dec. 1, pp. 96-102.

Banerjee, Abhijit Vinayak et al (2007) - 'Beyond Nandigram: Industrialisation in West Bengal', *Economic and Political Weekly*, vol. *42*, no. 17, Apr 28, pp. 1487-1489.

Cernea, Michael . /ed./ (1999) – *The Economics of Involuntary Settlement: Questions and Challenges*, World Bank Publications, Washington D.C.

Chandra, Nirmal Kumar (2008) - 'Tata Motors in Singur: A Step towards Industrialisation or Pauperisation?', *Economic & Political Weekly*, vol. 43, no. 50. Dec. 13 - 19, pp. 36, 41-51.

Cook, Ian et al (2013) - 'The Multiple Displacements of Mangalore Special Economic Zone', *Economic & Political Weekly*, vol. 48, no. 33, Aug 17, pp. 40-46.

Dash, Satya Prakash (2009) - 'Displacement and Resettlement Management in Thailand', *Economic & Political Weekly*, vol. 44, no. 47, Nov. 21, pp. 23-26.

Desai, Kaivalya et al (2007) -'Rehabilitation of the Indira SagarPariyojana Displaced', *Economic & Political Weekly Vol - XLII No. 51*.

Fernandes, Walter, J.C. Das, and S. Rao. (1989). "Displacement and Rehabilitation: An Estimate of Extent and Prospect". *In Development, Displacement and Rehabilitation.* Fernandes W. and E. G. Thukral (eds.). Indian Social Institute, New Delhi.

Ghatak, Maitreesh et al (2013) -'Land Acquisition and Compensation: What Really Happened in Singur?', *Economic & Political Weekly*, vol. 48, no. 21, May 25, pp. 32-44.

Mathur, Hari Mohan (2000) – 'The Role of Economists in Resettlement Planning', *Man & Development*, vol. 22, no. 3.

Modi, Renu (2013) - 'Displaced from Private Property Resettlement and Rehabilitation: Experiences from Mumbai', *Economic & Political Weekly*, vol. 48, no. 23, Jun. 8, pp. 71-74.

Nayak, Arun Kumar (2013) - 'Development, Displacement and Justice in India: Study of Hirakud Dam', *Social Change*, vol. 43, no. 3, Dec., pp. 397–419.

Parsuram, S. et al (2010) -'Sardar Sarovar Project: The War of Attrition', *Economic & Political Weekly*, vol. 45, no. 5, Jan. 30, pp. 39-48.

Pattnaik, Binay Kumar (2013) - 'Tribal Resistance Movements and the Politics of Development-Induced Displacement in Contemporary Orissa', *Social Change*, vol. 43, no. 1, Mar., pp. 53-78.

Sathe, Dhanmanjiri (2014) -'Vicissitudes in the Acquisition of Land: A Case Study', *Economic & Political Weekly*, vol. 49, no. 7, Feb 15, pp. 74-77.

Shah, Amita (2013) -'Mainstreaming or Marginalisation?: Evidence from Special Economic Zones in Gujarat', *Economic & Political Weekly*, vol. 48, no. 41, Oct. 12, pp. 55-61.

Sharma, E. A. S. (2011) - 'Sops for the Poor and a Bonus for Industry', *Economic & Political Weekly*, vol. 48, no. 41, Oct 12, pp. 55-61.

Sharma, R. N. (2009) -'Displacement in Singrauli Region: Entitlements and Rehabilitation', *Economic & Political Weekly*, vol. 44, no. 51, Dec 19, pp. 62-69.

Venkateswaran, Shankar (2007) - 'Industrial Displacement: Looking beyond Cash Compensation', *Economic and Political Weekly*, vol. 42, no. 22, Jun. 2, pp. 2050-2051.

Vyas, Aditi et al (2011) - 'Comparative Evaluation of Land Acquisition and Compensation Processes across the World', *Economic & Political Weekly*, vol. 46, no. 32, Aug. 6, pp. 94-102.