



A SPATIO ANALYTICAL STUDY ON CONSTRUCTION WORKERS (GUEST WORKERS) OF CHENNAI CITY: A SPECIAL REFERENCE TO OCCUPATIONAL HEALTH HAZARDS.

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ABSTRACT

The Construction industry is the backbone of a country as it creates the infrastructure necessary for economic and industrial growth. Construction workers are at a greater risk of developing certain health disorders and sickness than workers in many other industries. The objective was to study the socio economic profile and analyze the Occupational health conditions of construction workers over Chennai city. An elaborate study conducted at 200 construction sites within the city limits of Chennai and all workers (4 respondents per site) were enrolled as study subjects. Collection of data was done using a pretested semi structured questionnaire. The methodology used was descriptive statistics like percentages and multivariate analysis. Prevalence of the occupational disorders and health issues were spatially analyzed over various zones of Chennai city such as musculoskeletal disorders, skin diseases, cardiovascular diseases, followed by respiratory infections, gastrointestinal disorders etc. Results inferred was the musculoskeletal problems, respiratory problems, gastrointestinal infections, urinary tract and kidney problems were reported to be high among migrant construction workers. Measures are to be taken to improve the work environment of construction workers by ensuring the availability of personal protective equipments, good living conditions and sanitation facilities at the sites.

Keywords: Occupational Health, Guest workers, Construction sites, Spatial Analysis

INTRODUCTION:

Occupational health hazard is an ailment that occurs as a result of any occupational activity or work. Therefore, the term work-related diseases are utilized to describe diseases of occupational origin. This term however would then include both compensable and non-compensable diseases that have occupational origins. A "**guest worker**" is a person who either migrates within their home country or outside of it, in order to pursue work such as seasonal workers. They are also referred to as migrant workers or expatriates. Guest workers usually do not intend to stay permanently in the country or region they work in. The migrant population comprises about nearly one-third of India's population. Half of these populations from rural areas to cities are migrated in search of work. The primary causes of migration from rural areas are Lack of skill development and alternate livelihoods in source areas, the locations from where migration originates. More often than not, they are exploited and become more vulnerable and work in conditions where their rights are not protected. The guest workers usually form a class of invisible workers which is their major challenge. They work in poor conditions, with no access to government health services and schemes, which are usually available to other workers. Needs of family members, including infants, children, adolescents and elderly who accompany guest workers are left behind in source areas also need to be addressed. Migration of workforce to the construction sector is much higher than agricultural and industrial sectors of employment. As per the Times Now report, migrant inflow to the construction sector is much more pronounced than manufacturing sector.

Construction industry is the largest economic activity in India after agriculture as it is one of the stable growing industries of the world where the construction labour becomes crucial forming 7.5% of the world labour force. In India, it employs large number of unskilled, semiskilled as well as skilled workforce due to its huge demand. The workforce employed in the construction industry has to face several hardships at the work since it is one of the hazardous occupations. They face several issues and challenges as they are working at various construction and project sites that are highly dangerous in nature. Their major hardships are related to their safety at workplace, work-life balance, wage discrimination, harassment, and above all, working conditions as the biggest challenge. In spite of all these hazards, migrant inflow to the construction sector is much higher than manufacturing and agricultural sector. So, the migrant health has to be addressed and make them accessible to the health care centers to curb the problem in Chennai city construction sites. In the era of globalization, construction sector has established itself as a fast-growing industry, but very less research has been conducted on the occupational health hazards or on psychological problems and health conscious, among these workers especially in Asian countries. Hence, there is need to develop more projects focusing the health and safety consciousness among these workers as it is a burning issue (Singh et al., 2017). The Chennai city has a large migrant population with labourers living in slums and pavements. There are number of studies of the conditions of migrant workers who are living and working in slums and pavements. This study is focused on the nomadic temporary migrants, namely those who work in the Occupational setting of construction sites and who according to Trade Union representatives, 'are swelling in numbers during this decade. Women and children migrants comprise about one-third of these workers. They face serious problems related to work. So this study

aims to analyze the physical health impacts of both male and female migrant workers in the construction sites of Chennai city limits.

LITERATURE BACKGROUND:

Construction workers are exposed to health hazards in a wider variety at their work. Since these laborers are engaged in several types of tasks, they are exposed to multiple biological physical and chemical agents, that in turn make them vulnerable to various health problems that include - injuries, respiratory problems, dermatitis, musculoskeletal disorders and gastro-intestinal diseases (Gaurav et al., 2005). There are differences between the Workplace healths hazards and those found in the general environment. However, the work environment exposes many workers to health hazards that contribute to respiratory ailments, skin/dermatological problems, cardiovascular diseases, cancer, musculoskeletal disorders, reproductive disorders, mental health impacts and neurological illnesses, eye damage and hearing loss, as well as transmissible and non-transmissible diseases (Melinda.S.Meade). Exposures to hazardous substances have high potential to cause serious occupational diseases such as silicosis, lead poisoning, asbestosis, dermatitis and cancer; however, the awareness is negligible (Narayanan, 2010). Jayakrishnan et al. collected data samples from 387 workers and have reported that morbidity like typhoid (3.4%), tuberculosis (1%), jaundice (10.6%), and malaria (13.7%) were found to be higher than the general population. A study was done by Merck and Occuvison on older workers (among the people of age group 40 years) who suffer from photophobia or presbyopia conditions such as uveitis, trauma, acute glaucoma or injury in the eye region. Similarly, a study done by Manhas assessed the physical health status of male construction workers and he showed that 13% male workers faced extreme eye related problems. A study of Lakhani reported that 6% of construction workers had eye problem due to stone cutting. Disease transmission among migrant workers, and between them and their households and also the communities of origin, is a pivotal point and prominent area of focus, with specific interest in AIDS and HIV + in addition to other sexually transmitted infections (P.Mohan, 2019). In a study, it has been inferred that the female construction workers suffered from many health problems, like skin problems, constipation, backache and urinary tract infections(Sultana et al., 2014) There has been no significant association between duration of work/working hours with morbidity status of the workers which was similar to the studies of H .Patel et al and Jayakrishnan. Similar results were also found in studies by Bina Thomas et al and Trivedi Ashish et al which may be attributed to poor hygiene practices like non use of gloves, unclean hand washing and overcrowding. The conditions of physical health hazards increase with extremes of temperature, age factor, male gender, physical and mental state of the workers, personality traits of risk-taking behavior and personal habits like use of alcohol. (Pratik Jasani, 2017). Neerja Jaiswal in February 2016 while assessing the work-related musculo skeletal disorders among construction workers in India, has inferred that , as the accommodation is within the project site which leads to higher prevalence of respiratory issues that may be due to higher exposure to dust during the working hours and post-working hours. The respiratory morbidity previously reported was 4.46%, 12.6%, and 21.3% in other studies. The prevalence of injuries in previous studies was 6.6%, 7.56%, 7.9%, and 25.42% respectively. Most of the complaints were cough, cold and breathing difficulties looking similar to earlier reports, which may be exaggerated by lack of personal protective measures such as, using gloves,

masks, helmets, work related practices like wet grinding and overcrowding. In an epidemiological study conducted in southern India by C.J.Nirmala in 2019, it was found that the workers suffer from numerous health conditions related to their occupation. Migrants face various problems like diabetes, obesity, febrile illness and tuberculosis which have been suggested from the past empirical evidences (Akinola et al., 2014, and Adsul et al., 2011). Similarly another study by Biju George et al. (2013) has proven that migrant suffers from skin problem, eye problem, musculo-skeletal problem and waterborne diseases like typhoid, jaundice. It is also highly believed that due to their migration, leaving their spouse in home town and staying away from family, migrant male workers quite often associate with HIV positives (Rashmi Das, 2020). In another study, male workers were found to be more prone to work-related injuries in Gondar city of Ethiopia (Manas Padi, 2010). Village and Ostry developed a multivariate model for minimizing the musculoskeletal injuries of construction workers. Among migratory, illiterate, unskilled male construction workers in India, increased rates of tobacco and alcohol consumptions with high morbidity status were found while reviewing the evidences of development nexus in 2010. Work-related musculoskeletal disorders after the day's work had been reported by 84% construction workers of Murshidabad district in West Bengal, India (Kshamanidhi Adabar, 2011). Poor socio-economic condition was very common among the construction workers which leads them to anxiety related disorders and severe stress thus making them addicted to vices. The practice of tobacco, smoking, and Pawn chewing in majority of them in Cochin have arisen as a result of poor literacy and low socioeconomic status (Gaurab Biswas, R. Bhattacharya, 2017). Similarly, Bhaskar Rao, et al. (2013) found that the diseases caught on sites from contaminated drinking water and poor sanitation facilities were the most. According to a study commissioned by the Program Support Unit of the Andhra Pradesh Rural Livelihoods Program, most women migrants suffer malaria and diarrhea. Lack of Privacy, absence of toilet facilities, abuse and harassment by contractors and long working hours; take a toll on their health. The study states that education of children suffers the most due to migration. The prevalence of skin diseases among construction workers is much higher than in the common working population. A study was conducted in 92 construction workers of Ahmedabad and Vadodara and Conditions like frictional callosities, dry, fissured, scaly skin, infectious skin lesion, tinea cruris, lesion and ulcers on hands/soles were found by Karthik.R.Shah and Rajnarayan.R.Tiwari (2010). To conclude, both the increased duration of work & more daily working hours were found to be associated with more morbid skin conditions. Thus, it recommended that these workers should be provided some social security schemes with good occupational health services. Properly maintained and correctly used gloves are very effective means to prevent occupational skin diseases. The study carried out in Manipal, Karnataka among 340 male migratory construction workers in order to estimate the prevalence of respiratory & dermatological symptoms among migratory construction workers by Mayuri, Banerjee, Ramachandra Kamath et al., the migratory male workers suffered from multiple respiratory/dermatological symptoms which were neglected by them thinking that it is a minor health problem. The study undertaken to provide epidemiological data regarding various dermatoses among migrant construction workers in India especially in Mangalore, most [88%] workers were males and 51.17% were in their third decade, dermatoses, infective & non-infective symptoms were seen in 89.72% and 53.74% of labourers respectively. Masons had a significantly higher incidence of contact dermatitis to cement, viral infections and scabies than helpers. (Kuruville et al. 2006). Finally they have concluded that the pattern of

dermatoses is an expression of poverty, overcrowding and the occupational hazards of the construction industry and also varies as per their job description. The nature of work makes the labourers more vulnerable to skin diseases. In a study conducted at Northern Bravaria, the tile settlers and terrazzo workers within the construction industry, have been found to have a strikingly high incidence of OSD.(Bock, et al,2003).Study conducted by Barnabas et al., (2009) in Tamil Nadu, revealed a vast disparity in wages to exist between women and men construction workers. To sum up, it is found that women and men construction workers do not have access to social security and access to drinking water or healthcare but suffer subjection, harassment and discrimination leading to several types' occupational physical health problems.

AIM &OBJECTIVES:

The main **aim of the study** is to analyze the occupational health consequences [physical health] faced by the guest workers in the construction sites of Chennai city.

The main **objectives of the study** are:

1. To examine the migrants in the occupational setting of construction site
2. To assess the Socio economic and Occupational health conditions of guest workers at the Construction sites
3. To exhibit the spatial distribution of Occupational health conditions of guest workers.

STUDY AREA:

Chennai is the capital city of the Indian state of Tamil Nadu which was formerly known as Madras. Chennai is the fourth most populous metropolitan city; the sixth most populous city in India and the 31st largest urban area in the world. The areal extent of the city gives it a ranking of 27th out of the 640 cities of India. It is popularly known as the 'Gateway to South India' and it is well connected internationally as well as to the other parts of India. Chennai boasts of a rich historical legacy, which lends an inexplicable charm to the city. Chennai is located on the northeast of Tamil Nadu on the coast of the Bay of Bengal. It lies between 12 09' N and 13 09'N of the latitudes and 80 0' 12'' E and 80 0' 19'' E of the longitudes on a 'sandy shelving breaker swept beach'. It stretches for nearly 25.6 km along the coast of the Bay of Bengal, from Tiruvanmiyur on the South to Thiruvottriyur on the North. It runs inland in a rugged semi-circular fashion. It is bounded on the East by the Bay of the Bengal and on the remaining three sides by Kanchipuram and Thiruvallur districts of the state.

Figure 1
Location of the Study area

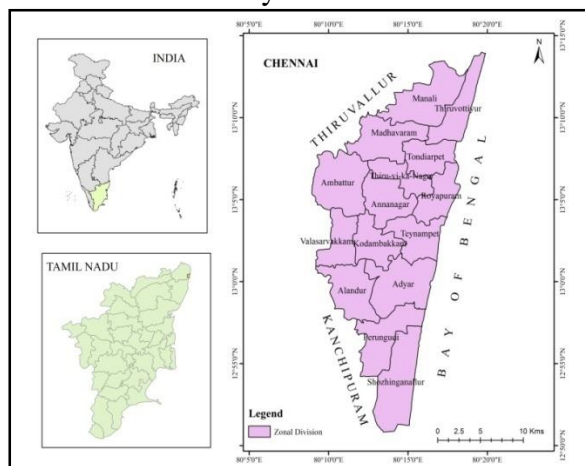
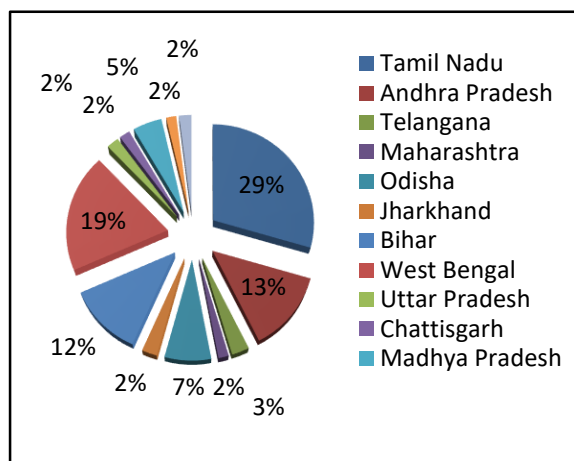


Figure 2
Percentage sharing of Migrates



Chennai is also a metropolitan city in India. The Chennai city has a large migrant population with labourers living in slums and pavements. This study is focused on the nomadic temporary migrants, namely those who work in the Occupational setting of construction sites and who according to Trade Union representatives, 'are swelling in numbers during this decade'. As per the Times Now report, migrant inflow to the construction sector is much more pronounced than manufacturing sector. The health hazards, risks, accidents, fatal injuries are occurring in more numbers in the construction sector than agricultural and manufacturing sector. They face serious problems related to work. So this study aims to analyze the physical health impacts of migrant workers in the construction sites of Chennai city. Chennai city has three broader administrative divisions, namely North Chennai, Central Chennai and South Chennai. The main limitation of the study was it is difficult to cover all the construction sites in all the 15 zones of the 3 administrative divisions respectively. Therefore, the sites have been selected based on the sampling method and availability of workforce.

DATA COLLECTION:

The study has utilized both the primary data and secondary data. The primary data have been generated from field visits and personal interviews with men and women workers at selected sample construction sites in Chennai city using focus groups discussion technique. Despite the language being a barrier, since the migrants were from various parts of India, interviews have been carried out with the help of translator. First, the sites have been visited and observed for making notes on the living and working conditions in the sites. Second, the boundaries and the facilities have been geotagged using a GPS. Third, personal interviews were carried out with the male and female workers at the sites. Lastly, the focus group discussions (FGD) have been conducted with "two sample –a- ward, one sample –a –site" choice from all the zones and sites with their subdivisions. The discussions have also been photo-documented for depicting the site situations. The sampling technique used for the study is Systematic Sampling. Chennai city is divided into 15 Zones as per Corporation of Chennai. Each Zone comprises of 144 wards. As per systematic sampling, where in one of the site would be an organized workplace and the other one would be an unorganized workplace to show the difference. In each site, data is collected from 4 respondents thus leading to a sample size of 800 respondents.

Since the migrant workers are belonging to the Floating population, their entire number is unavailable. The total samples collected are 800 {400 men + 400 women}. The sample sites selected from each category, fall in all three administrative divisions of Chennai city, namely the North, the Central and the South.

So the sample area were classified according to the Construction sites Types like Residential, Industrial, Commercial, and Institutional which will fall under organized and unorganized sites.

METHODOLOGY:

The collected data have been coded in the spreadsheet and analyzed using the Statistical Package for Social Sciences (SPSS). The descriptive analysis has been done where the socio economic details are represented. The multivariate analysis is carried out where multiple regressions technique has been done to find out the predominance of the physical health conditions among the migrant workers. The epidemiology of Occupational Physical Health problems of the workers throughout Chennai city are represented in the maps.

RESULTS & DISCUSSIONS:

The socio economic details of the respondents are including Age, Religion, Origin of Migration, Marital Status, Number of Children, Job description, Number of years Experience, Wages, Education Level, Work Hours, Accommodation, Sanitation, First generation migrant.

Table No. 01
Socio Economic profile of the Respondents

		Percent
Age	< 25 Years	27.3
	25-45 Years	57.3
	46-65 Years	15.3
	> 65 Years	.3
Religion	Hindu	77.8
	Christian	6.3
	Muslim	14.9
	Jain	1.1
Origin of Migration	Tamil Nadu	29.5
	Andhra Pradesh	13.1
	Telangana	2.8
	Maharashtra	1.6
	Odisha	7.3
	Jharkhand	2.4
	Bihar	11.8
	West Bengal	19.5
	Uttar Pradesh	2.0
	Chattisgarh	1.8
	Madhya Pradesh	4.8
	Assam	1.6
	Karnataka	2.0
Marital Status	Married	71.8
	unmarried	26.8
	Widow/widower	.9
	Divorcee	.6
Number of Children	no issues	32.4

	1	17.5
	2	34.1
	3	14.5
	4	.8
	more than 4 children	.8
Educational level	no school	39.1
	elementary/primary	24.1
	higher school	31.6
	College	5.1
	Total	100.0
Job Description	coolie	8.6
	mason	20.0
	helper	49.6
	fitter	7.9
	carpenter	3.4
	painter	5.3
	electrician	2.6
	plumber	2.6
Number of years experience	< 1 year	6.1
	1 to 5 years	28.9
	6 to 10 years	34.8
	11 to 20 years	21.8
	> 20 years	8.5
Total	100.0	
Wages	< 300 rupees	5.0
	300 to 500 rupees	36.3
	500 to 700 rupees	51.6
Work Hours	< 8 hours	15.4
	8 - 10 hours	60.0
	10 - 12 hours	23.5
	> 12 hours	1.1
Accommodation	staying on sites in tents	74.1
	taken rented house outside	9.3
	staying in relatives home in Chennai	6.8
	staying in friends joint accommodation	4.6
	staying at a common place provided by the company away from the site	5.3
Sanitation	toilet using on site	81.4
	going to public corporation toilets	18.6

From the above table, Maximum Number of respondents belong to the age group between 26 to 35 years with 37.6%, due to the employment of more youngsters and middle aged people into the construction sector. Among the different religions, 77.8 % of respondents are from Hinduism Religion forming the highest proportion. In the source from where they have originally migrated ,maximum number of respondents have migrated from other parts of Tamil Nadu with 29.5%.This shows that intra – state migration is more pronounced than inter – state migration as majority of the workers have migrated from the other districts within Tamil Nadu state itself to Chennai when compared to migrant workers from other states of India. Considering the marital status, maximum number of respondents are married showing 72.3%. Since early marriage is prevalent in many parts of North India, most of the respondents are married, while their progeny and off springs includes those who have 2 children forming the majority with 34.1%. Due to lack of knowledge about birth control measures, many respondents had more than 2 children. To assess their literacy level,39.1% of respondents have no formal school education. This shows that the Level of Literacy is very

less among the migrants, time and again which pushes them into this kind of employment. While describing the job employed or the type of laborer, maximum numbers of respondents are helpers comprising 49.6%. Due to the nature of work in construction sector, more number of respondents were employed as helpers. Similarly, the numbers of years of their work experience, maximum number of respondents had 6 to 10 years of experience -34.8%. This shows that the construction industry employs more freshers into the field who are new and are mostly school drop outs with less years of experience. Same way the income they get on a weekly basis are somewhat meager where the maximum number of respondents are those who earn between Rs.300 – Rs.500/- wages on a weekly basis comprising 36.3%. This shows that majority of the migrant workers are poorly paid every week after their work. While their hours of work a day include, 37.4% where the maximum number of respondents are those who work for 9 hours a day. This shows that the migrants work extra hours daily which is more than the normal labour work hours of 8 hours per day to complete their workload, leading to health issues. The dwelling places of the workers are 74% of respondents are those who are staying on sites in tents. This clearly indicates that migrants don't have proper dwelling places because of which they stay more on the sites in the dust and rubble which also lead to lot of health issues. About the sanitation facilities, 81.3% of respondents are using toilets on site where they work and live, with improper water supply and protection. These are the reason for many of the urinary infections and bladder related problems among the migrant workers.

OCCUPATIONAL HEALTH ISSUES:

Table No. 2 Physical health issues of the respondents

Physical Health	Mean	Std. Deviation
Skin	2.22	.765
Respiratory	1.95	.803
Cardio Vascular	1.83	.805
Gastro Intestinal	2.19	.758
Sexually Transmitted	1.01	.093
Waterborne	2.04	.816
Vector Borne	1.85	.777
Musculoskeletal	2.11	.836
Eye	1.96	.787
Urinary/Kidney	1.97	.846
Loss of Appetite	2.01	.784
Insomnia/Sleeplessness	2.01	.785
Hearing Impairment/Ear Issues	1.95	.849
Lifestyle Diseases	1.94	.788

Figure 3
Physical Health 1 & 2

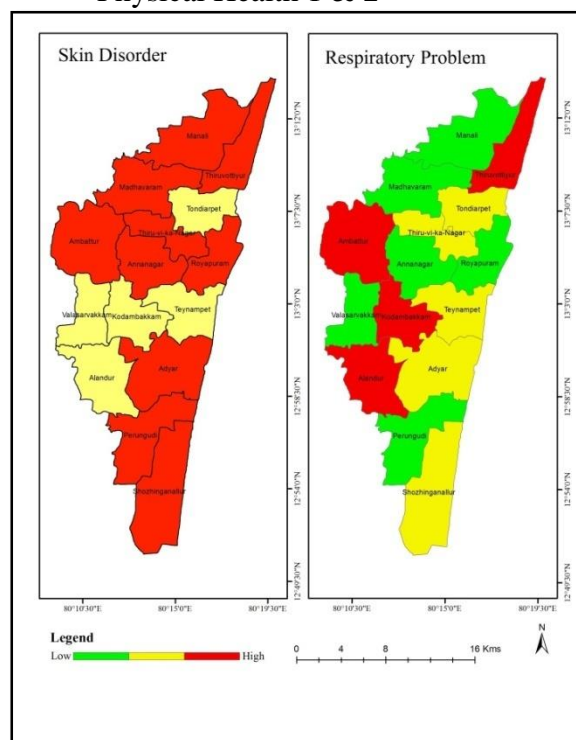
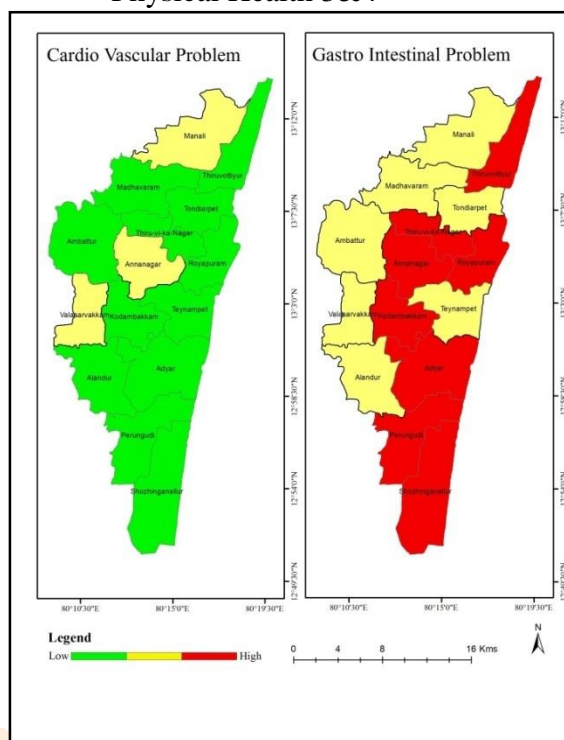


Figure 4
Physical Health 3&4



The skin/dermatological problems in Chennai are evenly distributed throughout North, South and Central Chennai with high and medium levels represented by the legends with Red and Yellow colours respectively. Hence, as the health map indicates that Skin problems are highly prevalent in the Zones of Thiruvotriyur, Manali, Madhavaram, Ambattur, Thiru-vi-ka-nagar, Anna nagar, Royapuram, Adyar, Perungudi, Shozinganallur and moderately prevalent in the Zones of Tondiarpet, Valasarawakkam, Kodambakkam and Alandur. The reason behind these are the respondents are mostly employed in Industrial sites more in the Northern Zones & also a few southern zones, where they work at intense conditions having heavy mixing, cementing works thus resulting in peeling off skin and the appearance of reddish marks leading to lesions and scars.

The respiratory problems in Chennai are evenly distributed throughout North, South and Central Chennai with high, medium and low levels represented by the legends with Red, Yellow and Light Green colours respectively. Seeing the epidemiological condition, it can be clearly inferred that Thiruvotriyur, Ambattur, Kodambakkam and Alandur are the zones that have respondents highly affected by Respiratory problems, while Thiru-vi-ka-Nagar, Tondiarpet, Teynampet, Adyar and Shozinganallur are the zones that have respondents moderately affected by Respiratory problems, whereas Manali, Annanagar, Madhavaram, Royapuram, Valasarawakkam and Perungudi are the zones that have respondents lowly affected by Respiratory problems. This clearly indicates that the migrant workers who inhale the maximum amount of toxic substances and industrial wastes are prone to respiratory health issues majorly due to the factory outlets, thermal plants construction works carried out by them in those zones.

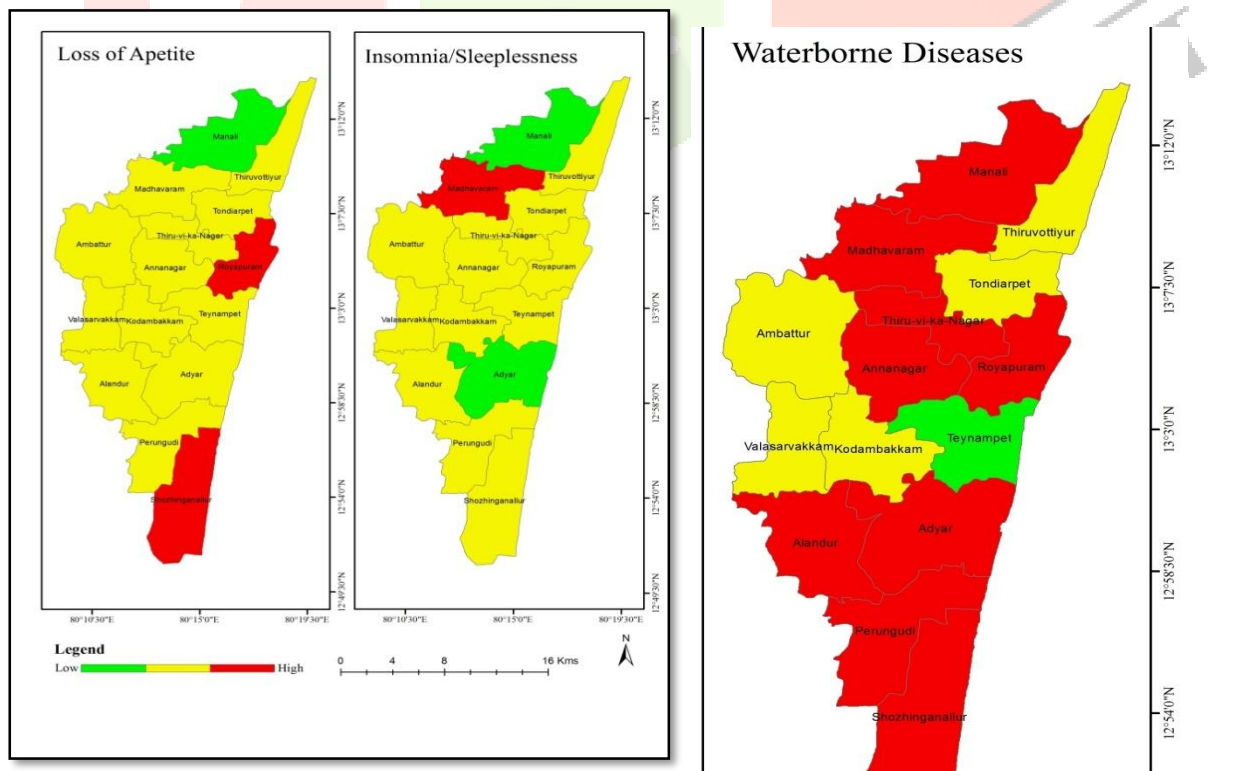
The cardiovascular diseases (CVD) in Chennai are spatially distributed throughout North, South and Central Chennai with high and medium levels represented by the legends with red and Yellow colours respectively.

Hence, as the health map indicates that cardiovascular diseases (CVD) are lowly prevalent in the Zones of Thiruvottriyur, Tondiarpet, Madhavaram, Ambattur, Thiru-vi-ka-nagar, Alandur, Royapuram, Kodambakkam, Teynampet, Adyar, Perungudi, Shozhinganallur and moderately prevalent in the Zones of Manali, Annanagar and Valasarawakkam. The reason behind these are the respondent are belonging to the middle aged group. So they arent much youth aged workers who are affected by cardiovascular diseases. The age old people who are into this industry ,working for so many years continuously lifting heavy load, other labourious items are more vulnerable to the CVDs. Hence CVDs are not highly prevalent in the Chennai city.

The Gastrointestinal disorders (GID) in Chennai are evenly distributed throughout North, South and Central Chennai with high and medium levels represented by the legends with Red and yellow colours respectively. Seeing the epideimological condition, it can be clearly inferred that Thiruvottriyur, Thiru-vi-ka Nagar, Royapuram, Kodambakkam, Annanagar, Perungudi, Shozhinganallur and Adyar are the zones that have respondents are the zones that have respondents moderately affected by Gastrointestinal disorders, whereas Manali, Madhvaram, Tondiarpet, Ambattur, Teynampet, Valasarawakkam, Alandur are the zones that have respondents highly affected by Gastrointestinal disorders. This clearly indicates that the migrant workers who starve for long hours and have improper dietary habits are prone to gastric and peptic ulcer leading to stomach related gastric disorders majorly due to the prolonged hours of construction works carried out by them in those zones where they were employed more in the Residential and Commercial sites.

Figure 5
Physica Health 5 & 6

Figure 6
Physica Health 7



The Waterborne Diseases(WBD) in Chennai are evenly distributed throughout North, South and Central Chennai with high, medium and low levels represented by the legends with Red, yellow and light green colours respectively. Seeing the epideimological condition, it can be clearly inferred that Seeing the

epidemiological condition, it can be clearly inferred that Manali, Madhavaram, Thiru-vi-ka-Nagar, Annanagar, Royapuram, Alandur, Adyar, Perungudi and Shozhinganallur are the zones that have respondents highly affected by WBDs, while Thiruvottriyur, Tondiarpet, Valasarawakkam, Kodambakkam, Ambattur are the zones that have respondents moderately affected by WBDs, whereas Teynampet is the zone that have respondents lowly affected by WBDs. This clearly indicates that the migrant workers who are exposed to more unclean, contaminated water and unsanitized work atmosphere and also drinking impure water are prone to Water borne diseases majorly due to the factory outlets, thermal plants construction works carried out by them in those zones

The Loss of Appetite in Chennai are spatially distributed throughout North, South and Central Chennai with lowest levels represented by the legend with high, medium and low levels represented by the legends with Red, yellow and light green colours respectively. Hence, as the health map indicates that Loss of Appetite are lowly prevalent in the Manali zone, whereas moderately prevalent in the zones of Thiruvottriyur, Madhavaram, Tondiarpet, Thiru-vi-ka-Nagar, Ambattur, Annanagar, Valasarawakkam, Kodambakkam, Teynampet, Adyar and Perungudi, while highly prevalent in the zones of Royapuram, Shozhinganallur. This clearly indicates that the migrant workers who are predominantly vulnerable to the Loss of appetite problem moderately as the workers work for longer hours skipping their lunch and meals and eating at odd hours. They are occupied so much on their work that they exceed their time of eating leading to loss of appetite and other digestive system related health issues. Loss of appetite is the base and the causative factor for so many other problems affecting the central nervous system, digestive system and also the cardiac system.

The Insomnia/Sleeplessness problems in Chennai are evenly distributed throughout North, South and Central Chennai with high, medium and low levels represented by the legends with Red, yellow and light green colours respectively. Seeing the epidemiological condition, it can be clearly inferred that seeing the epidemiological condition, it can be clearly inferred that Madhavaram is the zone that have respondents highly affected by Insomnia/Sleeplessness problems, while Thiruvottriyur, Tondiarpet, Thiru-vi-ka-Nagar, Ambattur, Annanagar, Royapuram, Valasarawakkam, Kodambakkam, Teynampet, Alandur, Perungudi and Shozhinganallur are the zones that have respondents moderately affected by Insomnia/Sleeplessness problems, whereas Adyar and Manali were the zones that have respondents lowly affected by Insomnia/Sleeplessness problems. The main reason behind this is that the migrant workers who are predominantly vulnerable to the Insomnia/sleeplessness problems moderately as the workers work for longer hours skipping their sleep and irregular working hours. They are occupied so much on their work that they exceed their time of sleeping, forgo their sleep and sometimes get overexhausted that they are devoid of sleep. This is prevalent at a medium level throughout central Chennai and some parts of North and South Chennai. The zones where the working patterns and hours are bit regular and disciplined have lower rates of insomnia problems. The workers who go back to their accommodation away from the sites are noticed to have lesser problems when compared to those who stay on sites and sleep over there all the night.

Figure 7
Physica Health 8 & 9

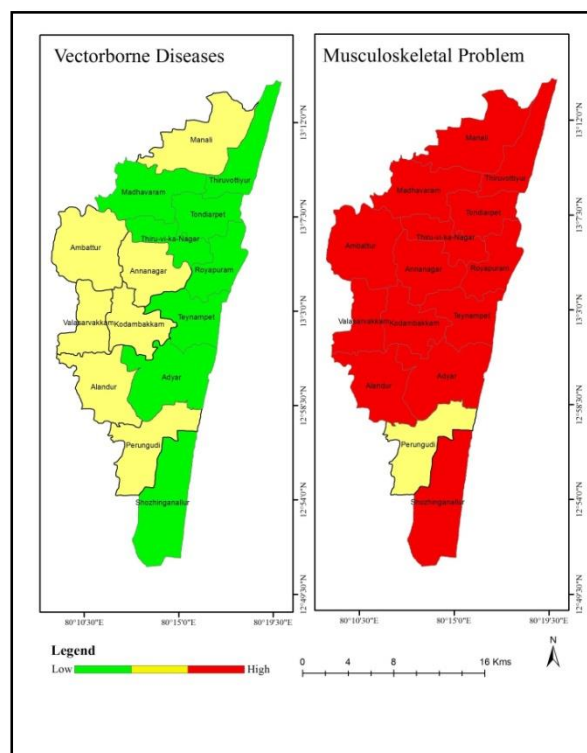
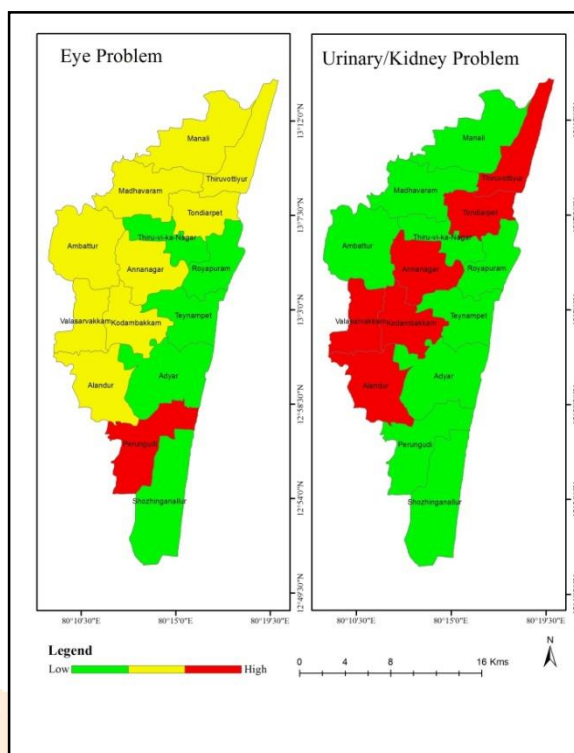


Figure 8
Physica Health 10 & 11



The Vectorborne Diseases(VBD) in Chennai are spatially distributed throughout North,South and Central Chennai with lowest levels represented by the legend with medium and low levels represented by the legends with yellow and light green colours respectively. Hence, as the health map indicates that Vectorborne Diseases(VBD) are lowly prevalent in the zones of Manali,Ambattur,Annanagar,Valasaravakkam,Kodambakkam,Alandur,Perungudi whereas moderately prevalent in the zones of Thiruvotriyur,Madhavaram,Tondiarpet,Thiru-vi-ka-Nagar,Royapuram,Teynampet,Adyar and Shozhinganallur.This clearly indicates that the migrant workers who are predominantly vulnerable to the Vectorborne Diseases(VBD) moderately as the workers work more in the open spaces with more exposure to contaminated water. They are more prone into vectors like mosquito bites, which are carriers of various diseases. Loss of appetite is the base and the causative factor for so many other problems affecting the central nervous system,digestive system and also the cardiac system.

The Musculo skeletal Disorders (MSD) in Chennai are evenly distributed throughout North,South and Central Chennai with high and medium levels represented by the legends with Red, and yellow colours respectively. Seeing the epideimological condition,it can be clearly inferred that seeing the epideimological condition, it can be clearly inferred that Perungundi is the only zone that have respondents highly affected by Musculo skeletal Disorders (MSD), while all the other zones such as Thiruvotriyur,Tondiarpet,Thiru-vi-ka-Nagar,Ambattur,Annanagar,Royapuram,Valasaravakkam,Kodambakkam,Teynampet,AlanduManali,Madgavaram,Adyar and Shozhinganallur are the zones that have respondents highly affected by Musculo skeletal Disorders (MSD).The main reason behind this is that the migrant workers who are highly vulnerable to the Musculo skeletal Disorders (MSD) as the workers work for longer hours ,also for a longer period of time

lifting heavy items leading to sprains, fractures, breaking of bones, and other muscle and bone related health issues. This is prevalent at a higher level throughout central Chennai and some parts of North and South Chennai. The zones Perungudi had more of newly migrated workers who are freshers into the industry. So, amateur workers who are gaining experience now are less vulnerable to musculoskeletal disorders. (MSDs)

The Eye Problems in Chennai are spatially distributed throughout North, South and Central Chennai with lowest levels represented by the legend with high, medium and low levels represented by the legends with Red, yellow and light green colours respectively. Hence, as the health map indicates that Eye Problems are lowly prevalent in the Thiru-vi-ka-Nagar, Royapuram, Teynampet, Adyar, Shozhinganallur, whereas moderately prevalent in the zones of Thiruvottriyur, Madhavaram, Tondiarpet, Manali, Ambattur, Annanagar, Valasarawakkam, Kodambakkam, Alandur, while highly prevalent in the zones of Perungudi. This clearly indicates that the migrant workers who are predominantly vulnerable to the Eye Problems moderately as the workers work for longer hours under welding related & other electrical works without proper coverage for eyes like Goggles. They are affected with retinal tear, vision related health issues.

The Urinary/Kidney problems in Chennai are evenly distributed throughout North, South and Central Chennai with high and low levels represented by the legends with Red and light green colours respectively. Seeing the epidemiological condition, it can be clearly inferred that, Thiruvottriyur, Tondiarpet, Annanagar, Valasarawakkam, Kodambakkam and Alandur are the zones that have respondents highly affected by Urinary/Kidney problems, whereas Manali, Madhavaram, Ambattur, Thiru-vi-ka-Nagar, Royapuram, Teynampet, Adyar, Perungudi and Shozhinganallur were the zones that have respondents lowly affected by Urinary/Kidney problems. The main reason behind this is that the migrant workers who are majorly vulnerable to the Urinary/Kidney problems lowly as the workers who are employed on sites use the toilets on sites instead of going for public toilets or open defecation. The women workers have more of reproductive tract infections. Miscarriages, abortions, still births are more common among the migrant women workers. Kidney stones, dysfunction, urinary infections, are seen at more older workers who are into this field for more number of years and also to those who are alcoholic drunkards due to heavy work load.

predominantly vulnerable to the Lifestyle Diseases moderately as the workers work for longer hours skipping their sleep, food, leisure activities and irregular working hours. They are occupied so much on their work that they exceed their time of sleeping, eating, drinking, sanitary habits, forgo their sleep, nutritious food, and sometimes get overexhausted that they are devoid of balanced diet and sleep. This is prevalent at a medium level throughout central Chennai and some parts of North and South Chennai. The zones where the working patterns and hours are bit regular and disciplined have lower rates of Lifestyle Diseases problems.

Table No. 3

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.595 ^a	.587	.672	.17331

a. Predictors: (Constant), First generation migrant, Job Description, Origin of Migration, Sanitation, Number of years experience, Education Level, Work Hours, Religion, Marital Status, Wages, Age, Number of Children, Accommodation.

The dependent variable is the Occupational Physical Health, where the Socio Economic details of the migrant workers are Independent variables which are to be considered for multiple regression to predict the Physical Health of the respondents. The Socio Economic details include Age, Religion, Origin of Migration, Marital Status, Number of Children, Job description, Number of years Experience, Wages, Education Level, Work Hours, Accommodation, Sanitation, First generation migrant which determine 58% (0.58 of R square value) of the Physical Health of the migrant workers.

Table No. 4

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.246	13	.173	5.753	.000 ^b
	Residual	23.610	786	.030		
	Total	25.856	799			

a. Dependent Variable: Mean_PH

b. Predictors: (Constant), First generation migrant, Job Description, Origin of Migration, Sanitation, Number of years experience, Education Level, Work Hours, Religion, Marital Status, Wages, Age, Number of Children, Accommodation

Since P value is less than 0.05. the null hypothesis is rejected leading to the acceptance of Alternative Hypothesis. This indicates that this model is suitable for predicting the Occupational Physical Health of the migrant workers on construction sites based on the above mentioned Socio Economic details.

Table No. 5
Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.859	.058		31.775	.000
	Age	.042	.013	.150	3.299	.001
	Religion	.006	.009	.025	.630	.529
	Origin of Migration	-.001	.002	-.013	-.343	.732
	Marital Status	.000	.016	.001	.025	.980
	Number of Children	-.002	.008	-.015	-.305	.760
	Job Description	.000	.005	-.004	-.099	.921
	Number of years experience	.019	.007	.109	2.540	.011
	Wages	.005	.011	.018	.429	.668
	Education Level	.000	.007	-.002	-.051	.959
	Work Hours	.029	.011	.104	2.709	.007
	Accommodation	.003	.008	.022	.444	.658
	Sanitation	-.099	.023	-.215	-4.273	.000

a. Dependent Variable: Mean_PH

$$y = 1.859 + 0.042 \text{ Age} + 0.019 \text{ Number of Experience} + 0.029 \text{ Work hours} - 0.099 \text{ Sanitation}$$

CONCLUSION:

Construction workers association working for the unorganized sector can conduct awareness programs among the construction workers of Chennai city and can also motivate them to join the laborer's organizations. Construction workers are not having any basic facilities. The welfare schemes for migrant workers are not reaching them. They are deprived of their basic rights and are exploited by the contractors. They are highly affected by different kinds of Physical Health hazards due to their occupation. So there is an urgent need for the protection of Construction workers to overcome these problems. The research has identified the problems of Construction workers which will help the government and NGO's to take remedial measures to promote the welfare of Construction workers and to protect their rights and also improve their health care services.

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