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Original Article

Knowledge of Lactating Mothers regarding Expression and Thawing of Breast Milk: Literature Review

Hemangi Chaudhari*, Vipin Vageriya**

Author Affiliation
*M.Sc. Nursing 2nd year Student
**Assistant Professor, Manikaka Topawala Institute of Nursing, Charusat Campus, Anand, Gujarat 388421, India.

Reprint Request
Vipin Vageriya
Assistant Professor, Manikaka Topawala Institute of Nursing, Charusat Campus, Anand, Gujarat 388421, India.
E-mail: vipinvageriya.nur@charusat.ac.in

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Abstract

Breastfeeding gives to baby the right nutrients and may protect baby against some illness. Breast feeding is the cheapest source to provide energy to newborn child. Breastfeeding, also known as nursing, is the feeding of babies and young children with milk from a woman's breast. *Objective:* To compare the knowledge regarding expression and thawing of breast milk among working and non working lactating mothers. *Methods:* A systematic literature review was conducted. The literature includes last 5 years data. The literature reviewed was obtained through different database includes CINHAL (Cumulative index to Nursing & Allied Health Literature), MEDLINE (Medical Literature Analysis & Retrieval System Online), PubMed, ScienceDirect, SpringerLink, ProQuest & Google scholar. *Result*: Majority of mothers are not aware about expression of breast milk from their breast. A well planned educational program is needed to sensitise the working and non working mother regarding thawing of breast milk. *Conclusion:* Expressed breast milk is important for children who are not able to suck breast milk properly. All the mother should have basic knowledge about expression and storage of breast milk.

Keywords: Expression of Milk; Breast Feeding; Storage of Milk; Newborn Protection; Lactating Mothers.

Introduction

Breast feeding is the one of the vital feeding for children those recently deliver. New born are completely depend on mother. Many of people consider breast feeding as best feeding for LBW and new born child. Breast milk is best nutritive milk which is easily available. The basic food of infant is mother's breast milk [1].

Breast milk is uniquely suited to mother's biologic needs and remains the best source of nutrition for the infant [2]. A newborn baby has only three desire.

1. New born feel warmth in the arms of own mother.
2. New born start to suck milk from her mother's breasts.
3. New born feel secure in lap of mother while sucking.

Breastfeeding satisfies all three demands [3]. The first milk of mother after deliver is called as colostrum, which contains higher amount of immunoglobulin IgA, which layered the gastrointestinal tract. Colostrum protects the child until its own immune system is starting to function properly. Colostrum work as a mild laxative, which helps in expelling of meconium (first stool of new born) and preventing the formation of of bilirubin [4]. Expression and storage of breast

milk is necessary to maintain temperature and hygienist of breast milk. Store breast milk can be utilise to child when mother and infant are separated like working mother [5]. Proper breast milk storage is necessary to preserve nutritional value of breast milk. The storage place should have infection preventing qualities [6]. It was concluded that working women needs knowledge about expression and thawing of the breast milk so that they can take care of their child, when they are outside.

Material Methods and Findings

The following electronic databases are searched: ProQuest, Embase, Pubmed, EBSCO, Scopus, the British Nursing Index and the Cumulative Index to Nursing & Allied Health Literature (CINHAL), e-journal and print journal available in library. The subject related books are also referred to collect the information.

Literature Review

A quantitative study was conducted to find out the impact of Self Instructional Module (SIM) in term of knowledge regarding collection and storage of expressed breast milk among mothers of infants by Ester Mary at specific children hospitals at Chennai in year 2017. The primary goal of study was—

a. To assess the level of knowledge in collection and storage of expressed breast milk among mothers of infants
b. To evaluate the impact of SIM in knowledge on collection and storage of expressed breast milk among mothers of Infants.
c. Research study design which used was Pre experimental one group pre-test and post-test. Target population of study were 100 lactating mothers. Sampling method was convenient sampling technique in which researcher collected data as per her convenience. MCQ based questionnaires was filled by participants during data collection. Data analysis was done by paired t test and association confirmed by chi square formula. . Result reveal that, in pre-test out of 100 samples, 15 (15%) were having adequate knowledge, 35 (35%) were having moderate knowledge and 50 (50%) were having inadequate knowledge. In post-test, out of 100 samples, 65 (65%) were having adequate knowledge, 25 (25%) were having moderate knowledge and 10 (10%) were having inadequate knowledge. The pre-test mean value was 10.62 with 24.81 standard deviation and post-test mean value was 25.96 with 0.98 standard deviation. Paired-t test shows that there is effectiveness of self-instructional module in knowledge on collection and storage of breast milk among mothers of infants at the level of $p<0.05$. Chi square test value give signal that there is significant association between the level of knowledge and demographic variables at the level of $p<0.05$. The study concluded that self-instructional module help to improve the mother's knowledge regarding collection and storage of breast milk. Findings from the study would be useful for working lactating mothers who may go back to work after the maternity leave period. Safe storage of breast milk is a positive sign towards exclusive breast feeding policy. A positive approach is require to accept practices regarding collection and storage of expressed breast milk among mothers of infants [7].

A quantitative study was conducted by Udoudo and Ajayi on working mother attitude and practices of exclusive breastfeeding in Amac, Nigeria in year 2015. Sample size was 324 working lactating mothers. Sampling method was simple random sampling. Questionnaires were used for data collection. Data were mapped by Simple percentage method. Result shows that—

a. Variables eg knowledge of mothers , attitude of mother towards exclusive breastfeeding, and mother's level of education were significant to practice of exclusive of breastfeeding,
b. Cultural beliefs were not associated with exclusive breastfeeding practice.

Study suggested more number of education awareness activities of exclusive breast feeding need to conduct. A live demonstration is also proposed to guide ways of expression of breast milk and storage of expressed breast milk. The requirement of crèches for lactating mothers was also highlighted in the result of study. So, this study helps in improving the rate of exclusive breastfeeding practice by working lactating mothers and the society at large [8].

A study was conducted at Karachi, Pakistan in 2015 by Jamil AS. The study design was cross-sectional study. The study title was factors affecting breastfeeding practices in working women. The objective of study was to identify factors affecting breastfeeding practices of employed mothers at their workplace. Sample size was 297 employee mothers. Sampling method was simple random sampling. Data were gathered by using structured questionnaire. Inferential statistics were used for result analysis.

Result shows that almost 86% of the mothers had received 3 months of maternity leave. Provision of lighter jobs and information about breastfeeding in mothers return to work were reported from 15% and 5% of the work places. Very Less (only) 1% of the workplaces had separate lactation rooms, a nursery for childcare, breast milk pump and refrigerator for storing mother's breast milk. This study revealed that many of the workplaces do not have basic facilities to support mothers. The workplace do not have provision of lighter job, breastfeeding breaks, lactation room in industry or office, childcare nursery, availability of breast milk pump, refrigerator [9].

Dr. Maitry S et al. conducted research study about knowledge, attitude and practices (KAP) regarding infant feeding practices among mothers at Ahmedabad, India in year 2014. The study design was cross sectional. It was observed that various practices were found in rural villages. The objective of study was to assess the knowledge of mothers towards infant feeding practices. Total number of participant mother was 200 who are coming to a tertiary care centre of Ahmedabad. The tool which was used to gather information was Interview and questionnaires. Result shows that out of the total, 1/4 of mothers were illiterate. 89% of mothers knew about exclusive breast feeding up to 6months of baby. More than 80% of mothers perceive that colostrum is good for newborn. 44.67% of mothers had given pre-lacteal feeds; tea and jaggery were most common. 89% of mothers knew that they should take extra food during lactation. 42% of fathers most commonly help in feeding while 31.33% don't get any domestic help. 65.67% of mothers had been counselled by doctor. 71.06% of mothers consulted doctor for feeding problems. Most common cause of stopping breast feeding was inadequate breast milk secretion that is 46.67%. 11% of mothers perceived that breastfeeding should be stopped during illness. 75.33% of mothers were completely satisfied with their feeding practices. This study concluded that there is strong need to improve the knowledge and awareness in the individual, society, community regarding community based care. The policy maker should address issues regarding remove myths and wrong practices regarding breast feeding which are playing dominant role in the community. Educational level is associated with infant feeding practices [10].

A study was cross sectional study conducted by Janet D on examining the practice of exclusive breastfeeding among professional working mothers at Kumasi Metropolis of Ghana in year 2014. The purpose of the study was to assess the practice of exclusive breastfeeding among working mothers at Ghana. Total number of participant was 1000 professional mothers. The age of participants were less than 40 year, who were full-time employment at Kumasi. Data were collected by using Purposive and random sampling technique. Tool to collect data was Questionnaire which consists of 4 alternative options. Each correct answer carries one mark. Result shows that 1/2 of working mothers were able to practice exclusive breastfeeding and 52% could not practice exclusive breastfeeding. The study declared that the lactating mothers were not getting space and facility for exclusively breastfeed their babies. The study recommended—

a. Employers must provide breastfeeding and expressing facilities at the work place to be used by breastfeeding mother

b. Facilities include hand washing and milk storage equipment like breast pump [11]

A Pune based quantitative research study was conducted by ShitalW with the objective to find out facility available regarding expressed breast milk and storage of breast milk in specific hospitals in year 2013. Sample size was 60 post natal mothers. Method of Sampling was non probability convenient sampling, in which researcher select participants as per her convenience. Self structured questionnaires and observational checklist was used for data collection. Paired t-test used for data analysis. Result showed that 72% of sample knows the meaning of expressed breast milk where as 87% of the samples know the meaning of exclusive breast feeding. Majority 67% of them knows the advantages of exclusive breast feeding. 65% of them preferred to give demand feeding to the baby whereas 80% of them preferred to breast feed their baby exclusively for one year. 63% of them preferred to express breast milk only when the breastfeeding is interrupted whereas 35% of them preferred to start weaning if exclusively breast feeding is interrupted. Only 18% of them felt to expressed breast milk when the breasts are full. Out of all, 37% of mother felt that whole breast should be pressed while expressing the breast milk. Many of them preferred to clean breast with soap and cold water. The information booklet regarding expression of breast milk was found to be effective in increasing the knowledge and practice among lactating working mothers. The samples had a highly significant gain in knowledge and practice after providing the information booklet [12].

A quantitative research study was conducted by Ekta S to find impact of self-instruction module (SIM) regarding knowledge of mothers in term of expression & storage of breast milk at Pune. The primary goal of

study was to check impact of self-instructional module on knowledge regarding expression and storage of breast milk among postnatal working women residing in selected areas of PCMC at Pune city. Total 60 postnatal working women selected for study as per inclusion criteria. Sampling technique selected for this research was simple random sampling, in which samples were gathered by probability sampling. Tools used for data collection was Questionnaires belongs to techniques of storage of breast milk. Data analysis had been done by using statistical formula. Result shows that pre-test average knowledge score of postnatal working women was 6.25 and post-test average knowledge score was 17.68. There was a significant association between socio demographic variables. The module seemed effective as it helps in improving the knowledge and creating awareness among mother [13].

A retrospective study conducted with the aim to determine duration of breast milk expression among working mothers enrolled in study. Total participant were 462 lactating women those fulfil study criteria. Non probability convenient sampling was used for collection of information from samples. Result shows that breastfeeding was initiated by majority of (97.5%) the mothers and about ½ study sample (57.8%) continuing for at least 6 months. 94.2% were returned to work after giving birth, 78.9% attempted pumping milk at work and 98% mothers were successful. Study concluded that industry sponsored lactation programs can enable employed mothers to provide breast milk for their babies as long as they wish [14].

A research study conducted by Nwet N et al. To find relation between breastfeeding duration and express breast milk at Perth, Australia in year 2003. The objective of study was to investigate the association between expression of breast milk and breastfeeding duration. Total number of sample were 587 mothers. Sampling method was non probability convenient sampling. Questionnaires and telephone interviews were planned at regular periods for the collection of desired information. Result shows that 93.5% of mothers gave breastfeeding at discharge from hospital. Mothers who expressed breast milk were less likely to discontinue any breastfeeding before six months. The study found that mothers who express breast milk are more likely to breastfeed for six months. It helps mother to achieve six months of full breastfeeding while giving more lifestyle options [15].

Conclusion

The review concluded that a thorough planning is required to sensatise working mother about importance of breast milk. An educational program is also required to educate mother about expression and thawing of breast milk.

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Original Article

Air Pollution Causes, Trends and Mitigative Measures to Improve Air Quality with Respect to Bangalore City

Najeebunnisa

Author Affiliation
Principal, BES LAW College, Bengaluru, Karnataka 560011, India & Research scholar, Gulbarga University, Kalaburagi, Karnataka 585106, India.

Reprint Request
Najeebunnisa,
Principal, BES LAW College, Bengaluru, Karnataka 560011, India & Research scholar, Gulbarga University, Kalaburagi, Karnataka 585106, India.
E-mail:
naazneen2002@gmail.com

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Abstract

Cities in India have witnessed a phenomenal growth in the last 2 decades both in population and number of vehicles. Population growth in cities is mainly attributed to migration of people in search of better employment, opportunities, whereas the increase in vehicular population is attributed to absence of efficient, comfortable and reliable public transport system. Bangalore is no exception to such phenomena.

"The level of urbanization in Karnataka as per the census has increased from 33.99% in 2001 to 38.57% in 2011, this population growth coupled with increase in household income and increase in commercial and industrial activities has placed heavy demands on urban transport system of the State, a demand that many cities have not been able to meet. As per Wikipedia, in 2011-12 Karnataka had 182 registered motor vehicles per 1000 population which is about 1 per 5 persons. Such huge number of vehicles in the cities cause increased traffic jams, congestions and air pollution. The average speed of the vehicles in Bengaluru city is less than 10 KMs per hour. As on 2016, the vehicle number has increased to 67 lakhs "

Keywords: Air Pollution Issues in Bengaluru City; Current Status and Trends.

Introduction

Air quality is an important component of overall quality of life enjoyed by a citizen. There are large number of studies and programs which have measured impact of quality of air that we breathe and live in. The quality impacts not only humans but entire ecosystem comprising plants, animals of this planet and building structures. Citizens are seriously concerned about deteriorating air quality especially in the urban areas in general.

Air pollution is emerging as an important concern in India. Levels of particulate matter (PM) are above the prescribed national standards in about 80% of Indian cities. Other than PM, gaseous pollutants like NO_2 and SO_2 are found to be high at specific locations. There is adequate evidence that air pollution has adverse effect on human health and agriculture in India.

Air pollution occurs when harmful substances including particulates and biological molecules are introduced into Earth's atmosphere. It may cause diseases, allergies or death in humans; it may also cause harm to other living organisms such as animals and food crops, and may damage the natural or built environment. Air pollution is by far the most harmful form of pollution in our environment. Air pollution is caused by the injurious smoke containing pollutants

namely Sulphur di oxide, carbon monoxide, oxides of nitrogen, particulate matter emitted by cars, buses, trucks, trains and factories e.g. asbestos, wood industries, construction industries etc.

Even smoke from burning leaves and cigarettes are harmful to the environment causing a lot of damage to man and the atmosphere.

Evidence of increasing air pollution is seen in lung cancer, asthma, allergies, and various breathing problems along with severe and irreparable damage to flora and fauna.

Even the most natural phenomenon of migratory birds has been hampered, with severe air pollution preventing them from reaching their seasonal metropolitan destinations of centuries.

Particle pollution, also called particulate matter ***or PM,*** is a mixture of solids and liquid droplets floating in the air. Some particles are released directly from a specific source, while others form in complicated chemical reactions in the atmosphere. Particles come in a wide range of sizes. Particles less than or equal to 10 micrometers in diameter are so small that they can get into the lungs, potentially causing serious health problems. Ten micrometers is less than the width of a single human hair. Coarse dust particles ***(PM_{10})*** are 2.5 to 10 micrometers in diameter. Sources include crushing or grinding operations and dust stirred up by vehicles on roads. Fine particles ***($PM_{2.5}$)*** are 2.5 micrometers in diameter or smaller, and can only be seen with an electron microscope. Fine particles are produced from all types of combustion, including motor vehicles, power plants, residential wood burning, forest fires, agricultural burning, and some industrial processes.

Acid rain is a result of air pollution. When any type of fuel is burnt, lots of different chemicals are produced. The smoke that comes from a fire or the fumes that come out of a car exhaust don't just contain the sooty grey particles that one can see - they also contains lots of invisible gases that can be even more harmful to our environment.

Power stations, factories and cars all burn fuels and therefore they all produce polluting gases. Some of these gases (especially nitrogen oxides and sulphur dioxide) react with the tiny droplets of water in clouds to form sulphuric and nitric acids. The rain from these clouds then falls as very weak acid - which is why it is known as ***"acid rain".***

During recent past, Bengaluru has achieved overall development due to establishment of IT, BT companies, Industries and increase of Construction activities. Due to this, there is an increase in population of the city, vehicles, which has impacted on Ambient Air Quality (AAQ) of the city. The Karnataka State Pollution Control Board (KSPCB) is regularly monitoring the Ambient Air Quality of the city at different locations. The monitoring results reveals that Particulate Matter concentration is exceeding the standard stipulated under National Ambient Air Quality Standards.

The level of urbanization in Karnataka as per the census has increased from 33.99% in 2001 to 38.57% in 2011, this population growth coupled with increase in household income and increase in commercial and industrial activities has placed heavy demands on urban transport system of the State, a demand that many cities have not been able to meet. As per Wikipedia, in 2011-12 Karnataka had 182 registered motor vehicles per 1000 population which is about 1 per 5 persons. Such huge number of vehicles in the cities cause increased traffic jams, congestions and air pollution. The average speed of the vehicles in Bengaluru city is less than 10 KMs per hour. As on 2016, the vehicle number has increased to 67 lakhs.

Status of Ambient Air Quality Monitoring Programme (NAAQM) in Bengaluru city:

The Board is monitoring the ambient air quality of Bengaluru city at 21 locations including seven Continuous Ambient Air Quality Monitoring Stations and using manual equipments under National Ambient Air Quality Monitoring Programme (NAMP) covering Industrial Area, Mixed Urban Area and Sensitive Area. Seven continuous ambient air quality monitoring stations (CAAQMS) installed at City Railway station, Regional Office complex at S.G Halli (Modi Hospital), KAVIKA on Mysore Road, Veterinary, College Hebbal, Silk Board, NIMHANS, Shalini Grounds, Jayanagar.

Ambient air quality monitoring is being carried out on 24 hourly basis for PM_{10}, $PM_{2.5}$, SO_2, NO_2, Ammonia, Lead and CO and the data is sent to CPCB, New Delhi electronically and also the data is displayed in the Board Web Site.

The Central Pollution Control Board has declared Bengaluru as one of the non-attainment cities with respect to particulate matter pollution based on the air quality data during 2009 to 2011.

Trends Of Ambient Air Quality In Different Zones In Bengaluru Is As Under:

- *Industrial Zone:* Four ambient air quality monitoring stations have been set up in the industrial zones of Bangalore city viz.

1. Export Promotional Park , ITPL ,White Field Industrial Area
2. KHB Industrial Area, Yelahanka
3. Peenya Industrial area (Gymkhana)
4. Peenya Industrial area, RO, Urban Ecopark

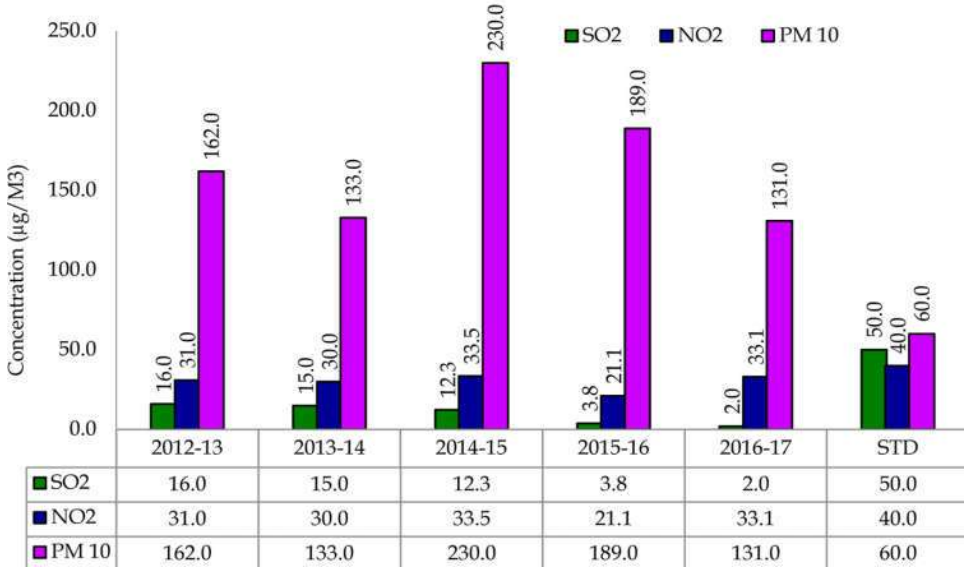
1. ITPL, White field road (Export Promotional Park), Bengaluru)

PM_{10} values have exceeded the national limit (60.0 µg/M3) in all measured years, whereas SO_2 and NO_2 values are within the national limit during the period 2012-2017. Higher levels of PM_{10} may be due to the construction activities and vehicular movement and road dust.

KHB Industrial Area, Bengaluru

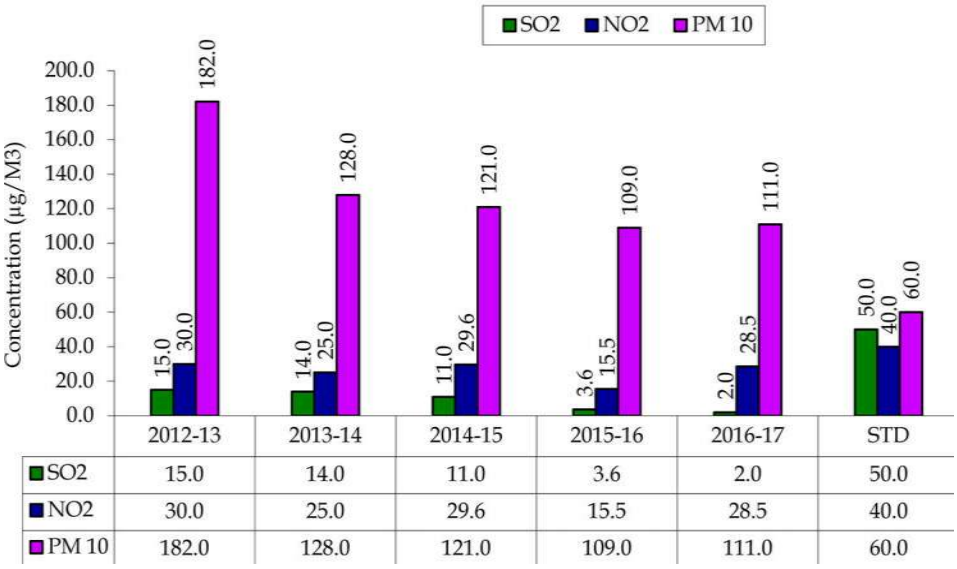
PM_{10} values are exceeded the national ambient air quality standard (60.0 µg/M3) in all measured years. During 2012-2017, PM_{10} values are around 3 fold higher than national limit, may be due to construction of International Air Port Road, whereas SO_2 and NO_2 are within the national limit during all the measured years 2012-17.

Graph 1:



	2012-13	2013-14	2014-15	2015-16	2016-17	STD
SO2	16.0	15.0	12.3	3.8	2.0	50.0
NO2	31.0	30.0	33.5	21.1	33.1	40.0
PM 10	162.0	133.0	230.0	189.0	131.0	60.0

Graph 2:



	2012-13	2013-14	2014-15	2015-16	2016-17	STD
SO2	15.0	14.0	11.0	3.6	2.0	50.0
NO2	30.0	25.0	29.6	15.5	28.5	40.0
PM 10	182.0	128.0	121.0	109.0	111.0	60.0

Peenya Industrial area (Urban Eco Park Peenya), Bengaluru

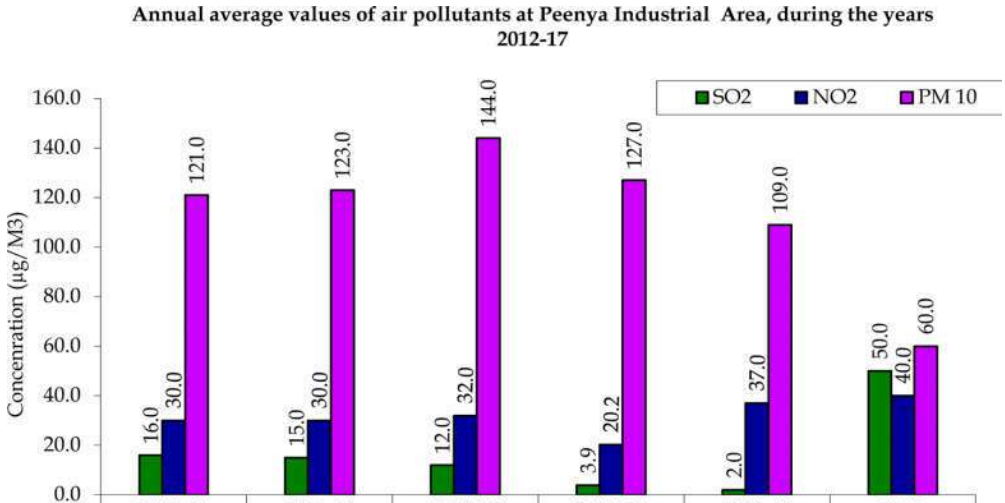
PM_{10} values are exceeded the national ambient air quality standard (60.0 µg/M3) in all the measured years due to the construction activities and vehicular movement and road dust whereas SO_2 and NO_2 are within the national limit in all the measured years 2012-17.

IMTA/Swan Silk Industry, Peenya, Bengaluru

PM_{10} values are exceeded the national ambient air quality standard (60.0 µg/M3) in all the measured years , due to the construction activities and vehicular movement and road dust , Whereas SO_2 and NO_2 are within the national limit in all the measured years 2013-17.

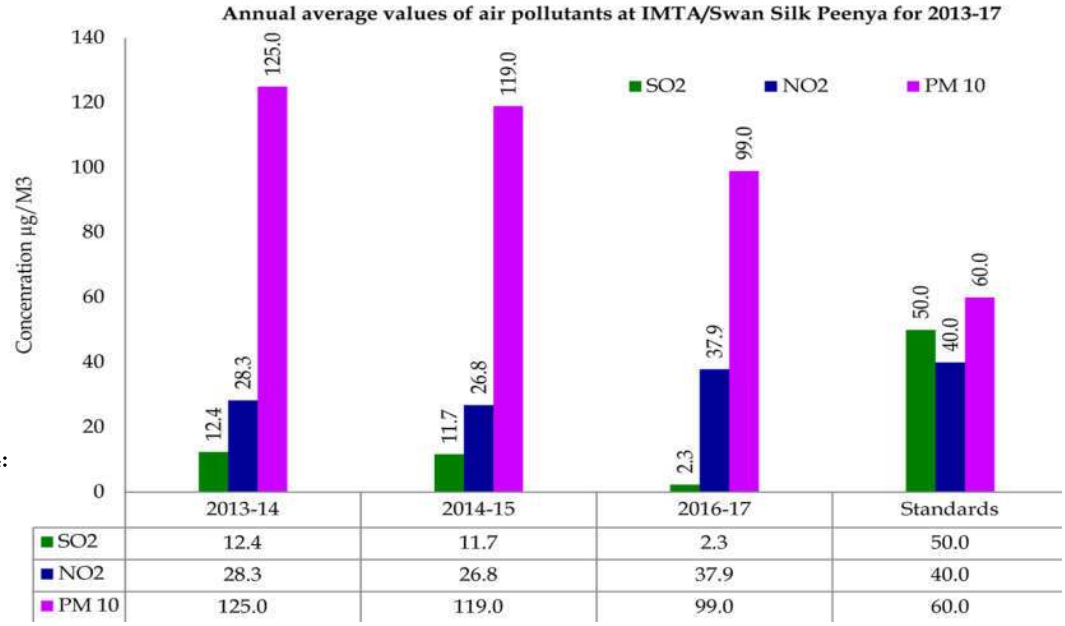
Mixed urban zone: Eight ambient air quality monitoring stations have been set up in the mixed zone (Residential, Rural & Other areas) of Bangalore city viz. 1. AMCO Batteries, Mysore Road. 2. Yeshwanthpur Police Station, 3. Central Silk Board, Hosur Road, 4. DTDC office, Victoria Road, 5. Teri Office, Domlur, 6. Banaswadi Police Station, 7. Kazisummanahalli, White Field, 8. UVCE, KR Circle, Bangalore.

Graph 3:



	2012-13	2013-14	2014-15	2015-16	2016-17	STD
SO2	16.0	15.0	12.0	3.9	2.0	50.0
NO2	30.0	30.0	32.0	20.2	37.0	40.0
PM 10	121.0	123.0	144.0	127.0	109.0	60.0

Graph 4:



	2013-14	2014-15	2016-17	Standards
SO2	12.4	11.7	2.3	50.0
NO2	28.3	26.8	37.9	40.0
PM 10	125.0	119.0	99.0	60.0

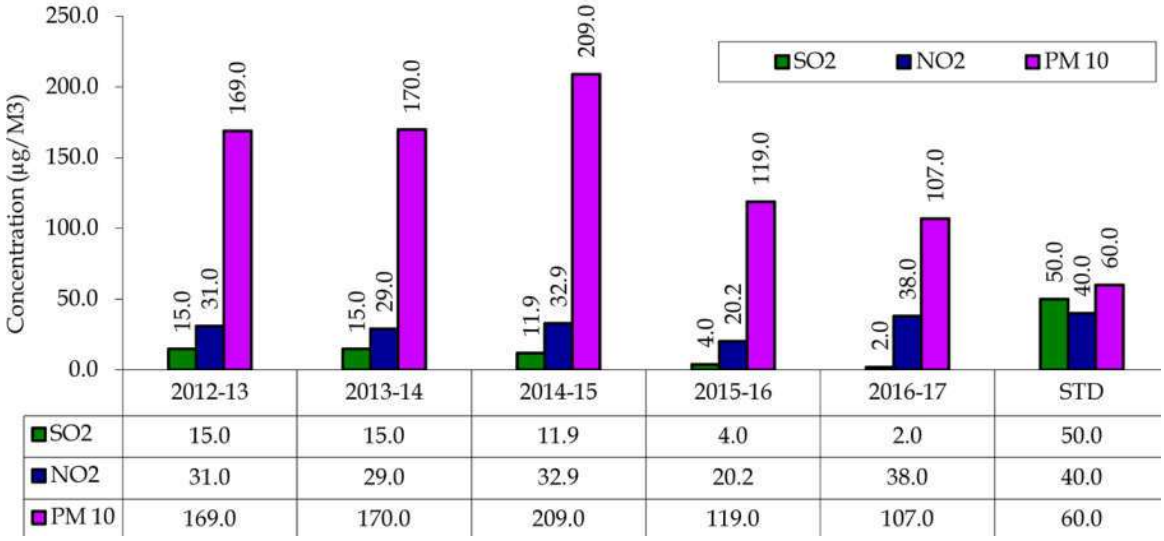
AMCO Batteries Mysore Road, Bengaluru

PM_{10} values have exceeded the national ambient air quality limit (60.0 µg/m^3) during the years 2012-2017, PM_{10} values are around 3 fold higher than national limit, due to the construction activities and vehicular movement and road dust. Whereas SO_2 and NO_2 are well within the national limit during the years 2012 -2017.

Yeshwanthpur Police Station, Bengaluru

PM10 values have exceeded the national ambient air quality standard (60.0 µg/m^3) in all measured years whereas SO_2 and NO_2 are within the national limit during 2012-17. Higher levels PM_{10} is due to the construction activities and vehicular movement and road dust.

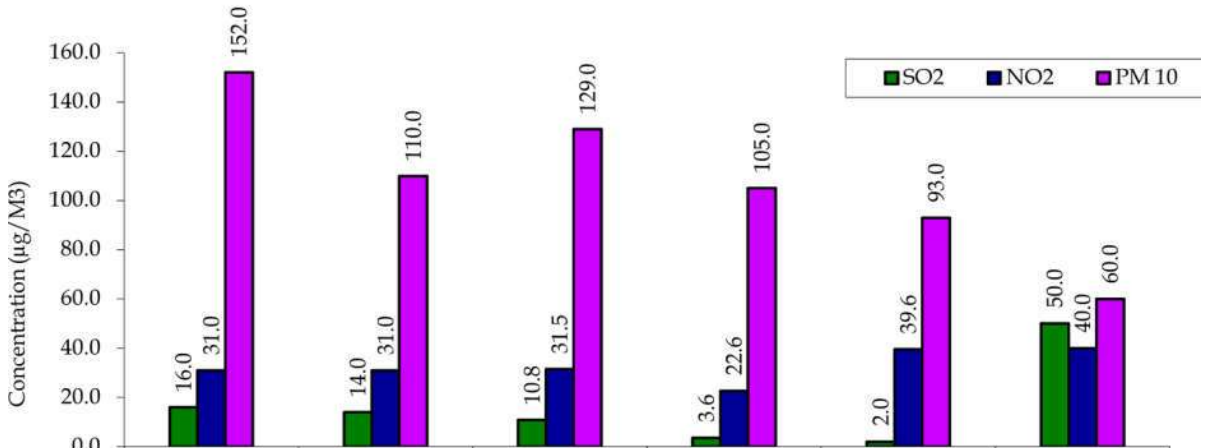
Annual avarage values of air pollutants at AMCO Batteries, Mysore Road, during the years 2012-17



	2012-13	2013-14	2014-15	2015-16	2016-17	STD
SO2	15.0	15.0	11.9	4.0	2.0	50.0
NO2	31.0	29.0	32.9	20.2	38.0	40.0
PM 10	169.0	170.0	209.0	119.0	107.0	60.0

Graph 5:

Annual average values of air pollutants at Yeshwanthpur Police Station during the year 2012-17



	2012-13	2013-14	2014-15	2015-16	2016-17	STD
SO2	16.0	14.0	10.8	3.6	2.0	50.0
NO2	31.0	31.0	31.5	22.6	39.6	40.0
PM 10	152.0	110.0	129.0	105.0	93.0	60.0

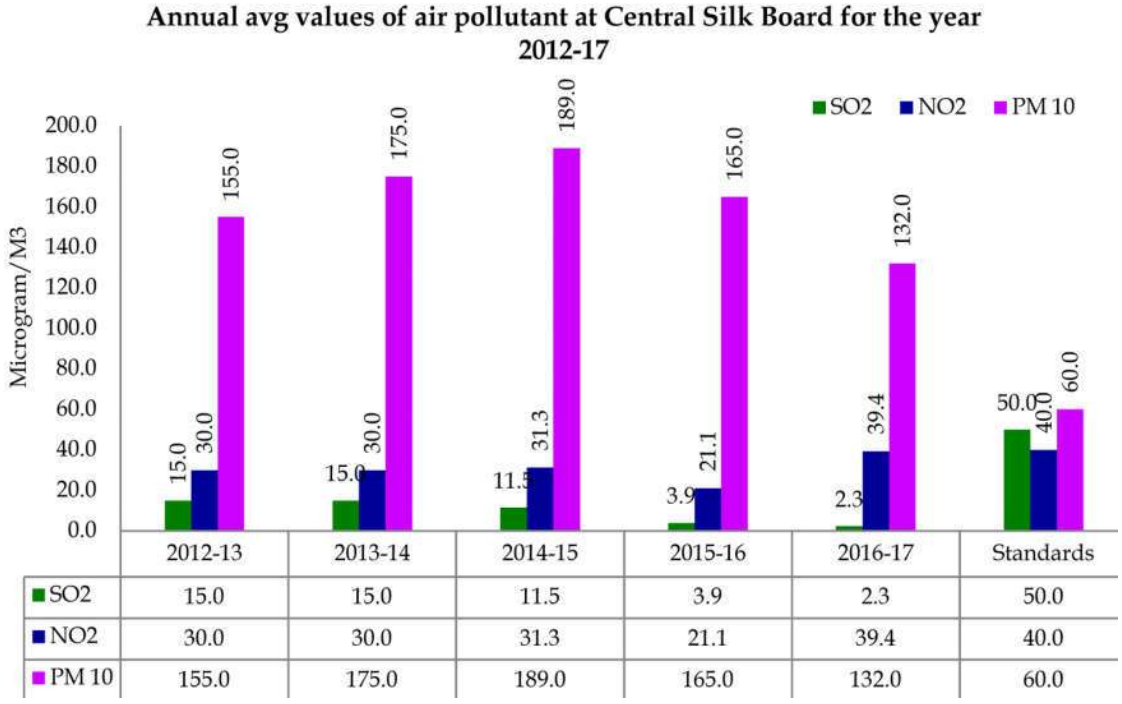
Graph 6:

Central Silk Board, Hosur road, Bengaluru

PM_{10} values have exceeded the national ambient air quality standard (60.0 µg/M3) in all measured years, During 2012-2017 PM_{10} values are around 3 fold higher than national limit, due to the construction activities and vehicular movement and road dust whereas SO_2 and NO_2 are within the national limit during 2012-17.

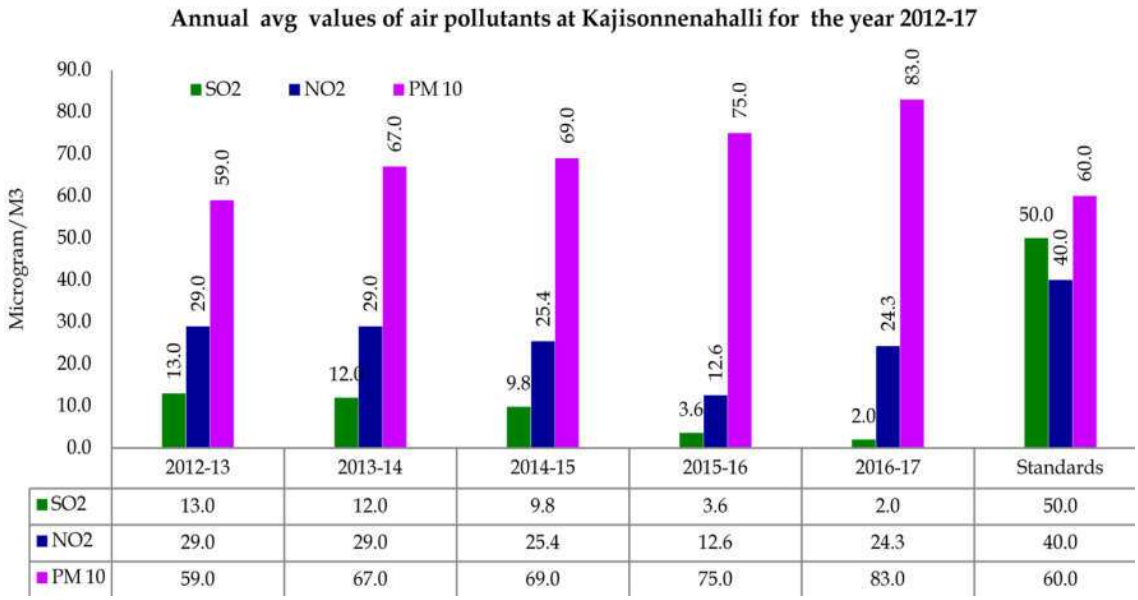
Madavachari House, Kajisonnenahalli, Bengaluru

PM_{10} values have slightly higher than the national ambient air quality standard (60.0 µg/M3) in all measured years except in the year 2012-2013 , where the PM_{10} value is 59.0 µg/M3 in the year 2012-13 which is near to the National limits (60.0 µg/M3) whereas SO_2 and NO_2 are within the national limit during 2012 -17.



	2012-13	2013-14	2014-15	2015-16	2016-17	Standards
SO2	15.0	15.0	11.5	3.9	2.3	50.0
NO2	30.0	30.0	31.3	21.1	39.4	40.0
PM 10	155.0	175.0	189.0	165.0	132.0	60.0

Graph 7:



	2012-13	2013-14	2014-15	2015-16	2016-17	Standards
SO2	13.0	12.0	9.8	3.6	2.0	50.0
NO2	29.0	29.0	25.4	12.6	24.3	40.0
PM 10	59.0	67.0	69.0	75.0	83.0	60.0

Graph 8: