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AN OBSERVATIONAL STUDY TO ASSESS THE ENVIRONMENTAL HEALTH STATUS OF CHILDREN IN SELECTED ANGANWADI CENTERS AT GWALIOR

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Abstract
This study was conducted to evaluate the environmental health status of children between the ages of 2 to 6 years coming to Anganwadi centers in Gwalior, Madhya Pradesh with particular reference to sanitation, water, and waste. A cross-sectional observational design was used, and 150 children and their corresponding Anganwadi centers were selected by the use of stratified random sampling. The investigators used self-developed structured questionnaires to obtain data from the caregiver and Anganwadi worker respondents, and checklists for the physical assessment of the environmental conditions of the centers. The correlations between environmental factors and child health outcomes were tested by descriptive and inferential statistics. The study established that there were huge differences between the rural and urban areas with the urban areas having relatively better sanitation facilities, water quality, and waste disposal systems. Large-scale statistical analysis revealed that there is a significant association between environmental quality and childhood diseases with sanitation having the strongest relationship (r = 0.72), followed by water (r = 0.65) and waste disposal (r = 0.58). These findings underscore the need for enhancing the physical environment of Anganwadi centers, especially in rural settings to enhance the health of children. The findings of the study point to the direction that it is imperative to tailor the intervention to improve sanitation, water, and waste disposal in the Anganwadi centers. More future studies should be conducted on long-term outcomes of environmental changes on child health taking into consideration other determinants of child development such as nutrition and immunization.

Keywords*: Environmental Health, Anganwadi Centers, Children, Gwalior, Observational Study.*

1. Introduction

Importance of Environmental Health for Children: EH is an important determinant of child health as children are highly susceptible to environmental risks because of their developing immune systems; they are at high risk of diseases associated with poor sanitation, unsafe water, and air pollution. The above and other research says that early childhood environmental risks have adverse effects, which include respiratory diseases, gastrointestinal infections, and developmental disorders among others (Meena, Kaushal, & Saxena, 2015). This is a time when interventions are most effective and hence early childhood is important in assessing and enhancing the environment children are exposed to.

Role of Anganwadi Centers in Child Development: The Anganwadi centers in India are at the hub of early childhood care and education (ECCE). These centers do not only impart primary education but also offer nutritional, health, and early childhood development through several programs under the Integrated Child Development Services (ICDS). They act as channels for delivering interventions for the improvement of the health of the people particularly in the hard-to-reach populations. However, the quality of the environment where these centres are located, the hygiene standards, and the availability of clean water in those centers influence the health and development of the children attending them (Baliga & Walvekar, 2017).

Overview of Environmental Health Concerns in India and Gwalior: The situation in India still presents many environmental health issues, especially in the rural areas where infrastructure is usually needed. It was established that inadequate access to improved water, hygiene, and sanitation facilities as well as lack of proper waste disposal are the anticipated concerns that affect children's health (Malik, Bhilwar, Rustagi, & Taneja, 2015). The Anganwadi centers in Gwalior as well as many other parts of India are in poor condition with poor funds and insufficient infrastructure to create adequate hygiene and health conditions for children. Research evidence has established that the environment in Anganwadi centers affects children's health and early childhood intervention programs (Rao & Kaul, 2018).

Why Should Environmental Health be Assessed in Anganwadi Centers? It is imperative to evaluate the environmental health in Anganwadi centers because these centers play the most significant role in the growth of children in rural as well as urban India. Environmental conditions influence the growth, immune system, as well as learning ability of children. The prevailing environmental conditions that are characterized by inadequate and dirty water or poor hygiene can cause diseases that negate the gains made in health from education efforts (Chudasama *et al*., 2015). Because these Anganwadi centers are central to Early Childhood Care and Education, it becomes important to examine whether the centers are conducive to the health of the children by giving them adequate care and nutrition (Sabat & Karmee, 2020).

Gaps in Existing Research: Despite the increasing number of studies available on the effects of the environment on children's health, there is a lack of literature regarding the effects, particularly on the Anganwadi centers in Gwalior and other areas. To the best of my knowledge, the majority of research work has been carried out on large rural areas or the impact of child development programs without showing environmental health as a key determinant (Masthi & Pruthvi, 2022). This study intends to cater to this gap by focusing on evaluating the EH conditions of Anganwadi centers in Gwalior.

Objective:

1. To evaluate the environmental health conditions in selected Anganwadi centers in Gwalior: This incorporates evaluation of some important indicators like; water consumption, sanitation, waste disposal, and hygiene practices since these play important roles in child beneficiaries' health in those centers
2. To identify areas requiring improvement for creating a safer and healthier environment for children: Therefore, the study intends to establish an understanding of the existing environmental factors that impact children's health and well-being to advance recommendations to enhance the situation

2. Literature Review

Overview of Previous Studies on Environmental Health and Children:

Environmental health is thus an important intervention strategy in children's physical and mental growth. Several types of research have indicated that the environment in which the child grows up has an impact on his/her health for example; clean drinking water, sanitation, and disposal systems. For instance, Chudasama *et al*. (2015) conducted a study to assess the extent of functioning of Anganwadi centers in Gujarat and stressed the fact that structural modifications to the environment if brought about can grossly enhance the health and development of children. Similarly, Meena, Kaushal, and Saxena (2015) noted that poor environmental health conditions in Anganwadi centers hindered children's growth through frequent illnesses and malnutrition.

Such research works that include Masthi and Pruthvi, (2022) insist that in the fight against diseases affecting preschool children, the issue of sanitation and hygiene practices should not be overlooked. So, the present study highlights the need to improve the environmental quality of Anganwadi centers for the development of children.

Health Risks Associated with Environmental Factors:

Contaminated air, water, and sanitation increase the risk of health-related issues in children. Unsafe water causes diarrhea and most gastrointestinal infections and poor hygiene practices cause helminth infections, and malnutrition (Malik *et al*.,

2015). Nath and Sengupta (2010) pointed out that children growing up in unhygienic settings are prone to respiratory and skin ailments.
Research also reveals further that bad sanitation habits coupled with breathing toxic air overtly contribute to some diseases in children and contribute majorly to part persistent respiratory diseases (Baliga & Walvekar, 2017). These risks have to be managed to improve the general well-being and development of children in Anganwadi centers.

Policies and Programs in India for Child Health Through Anganwadis:

The ICDS program of India envisages the integrated development of children under six years of age through health care, nutrition, and education. The program includes an indication of the importance of Anganwadi centers in early childhood care and development and in fighting malnutrition, anemia, and other related problems (Rao & Kaul, 2018).
Although there are good policies formulated under ICDS, there is a lack of adequate infrastructure to support good implementation due to poor resources. Sabat and Karmee (2020) conducted a study on the Anganwadi centers in Odisha state and reported the centers' major weaknesses in supplying safe drinking water and adequate sanitation services. In the same way, Shashidhar (2012) has done a similar review of the implementation of ICDS and pointed out the concern of lack of monitoring and appropriate utilization of resources in service delivery.
Strategies to enhance environmental health in Anganwadi centers conform with India's vision of attaining Sustainable Development Goals especially; SDG 3- Health and Well-being and SDG 6- Clean Water and Sanitation. Such policies when implemented in conjunction with the local-based intercessions make children live in a safer and healthier world.

3. Methodology

Study Design

The present study was conducted using an observational, cross-sectional survey, to evaluate the environmental health of children of age 2–6 years, enrolled in Anganwadi centres in the city of Gwalior, Madhya Pradesh. This design was adopted to capture a cross-sectional prevalence of environmental health conditions and their likely effects on child health.

Study Area

The actual study was done in Gwalior which is a city in the central Indian state of Madhya Pradesh. Thus, Gwalior is a mixed urban and rural area, and the changes in environmental conditions of the Anganwadi centres can be best studied here. Only some centers from both the urban and rural areas were chosen to capture all the environmental health conditions.

Study Population

The target population for this study consisted of three distinct groups: first, children aged 2–6 years who were enrolled in the selected Anganwadi centers. These children were of most interest to the study because the various health and development outcomes of these children were strongly linked to the environmental conditions in the centers. Second, and weighing in as a major source of data, caregivers were the parents or legal guardians of the children, and thus knowledgeable about the general practices within their households in the areas of hygiene, sanitation, and health. Finally, the Anganwadi workers also participated in the study as key informants. They were supposed to give a wealth of information about the infrastructure, physical amenities, and some aspects of health practices at the centers, which could be used to evaluate the effect of the environment on the children. All these groups provided useful information to the study in the evaluation of environmental health in Anganwadi centers.

Sample Size Determination

The sample size was calculated using the formula:

$$n = \frac{Z^2 \cdot p \cdot (1-p)}{d^2}$$

Where: Z=1.96 (corresponding to a 95% confidence interval), p= 0.5 (expected proportion of poor environmental health conditions), d=0.05 (margin of error).
According to this calculation, 150 children along with their related Anganwadi centers were taken in this study by using a stratified random sampling technique that covers different economic and geographical classes of the society.

Data Collection Tools

Data for this study were collected using two primary tools: The tools used were structured questionnaires and an observational checklist. The structured questionnaires were self-completed by both the caregivers and Anganwadi workers and included questions on environmental health and hygiene practices. Others were concerned with hygiene including hand washing and disposal of wastes, availability and storage of safe drinking water, use of household sanitation facilities, and health and sanitation literacy. The questionnaires focused on the observation of behaviors and knowledge possessed by the caregivers and the workers that were relevant to the children's health status. The observational checklist was applied by the research team to record the environmental contexts of the Anganwadi centres. Observations made and compared with benchmarks included Sanitation facilities including availability and cleanliness of toilets, Source, quality, and storage of drinking water, Waste disposal, and hygiene of other physical facilities including play areas. Collectively, these tools offered a detailed picture of the child and contextual factors influencing the health of children enrolled at Anganwadi centers.

Inclusion and Exclusion Criteria

The inclusion criteria for this study were as follows: For the present study, children aged 2–6 years who were enrolled at the selected Anganwadi centers were considered as the main participants. For this study, only those Caregivers and Anganwadi workers who volunteered for the study and were willing to give their informed consent were considered for the study. Further, the study targeted only those Anganwadi centers that were in existence for more than one year to avoid volatility in the study findings. The exclusion criteria included children with severe diseases incompatible with life, or those whose diseases could affect their ability to endure the test environmental conditions; the rationale being that such case scenarios may distort the assessment of the effects of the test environmental conditions. In addition, if an Anganwadi center was under construction or was temporarily closed down, it was not included in the sample to eliminate any confounding effects due to changes in the quality of its services or functioning during the research.

Data Analysis

The data collected were analyzed using statistical software. A descriptive analysis of data on sanitation, water quality, and hygiene practices was done using frequencies, percentages, and mean scores. Chi-square tests were used to test the relationships between categorical variables such as the type of sanitation facility and child health outcomes while t-tests were used to compare means of continuous data such as water quality scores of urban and rural centers. The initial analysis for internal consistency of covariates was $p<0.05$ using the Cramer's V test.

Study Limitations

There were several limitations of this study. The realization of the study could have been hampered by the fact that due to a shortage of resources, only a limited number of Anganwadi centers could be assessed, hence the results might not be fully generalizable. Furthermore, there is always bias in assessing the data due to overly optimistic or possibly exaggerated reported methods by the caregivers and the workers. Moreover, it is a cross-sectional research, and therefore, the temporal limitations of the study do not allow one to establish the causal relations between environmental factors and child health outcomes.

5. Results

Demographics

The research aim was to evaluate the environmental health among children of age 2 to 6 years in selected Anganwadi centres in Gwalior. The target population was 150 children selected from both the urban and rural settings. The demographic breakdown is presented below:

Table 1: Demographics of Children Aged 2–6 Years Enrolled in Anganwadi Centers in Gwalior

Age Group	Male (Urban)	Female (Urban)	Male (Rural)	Female (Rural)	Illnesses (Freq)	Poor Sanitation (Freq)	Water Quality Issues (Freq)
2-3	40	35	35	30	10	15	12
4-5	45	40	35	35	8	13	14
6	35	30	40	30	6	10	10

Environmental Health Status

Sanitation Facilities:

This study established the level of access to sanitation facilities and whether the available facilities were suitable for the rural and urban areas. The next figure 1 presents the percentage of adequate and inadequate sanitation facilities in both urban and rural areas. The findings are summarized in the following table:

Table 2: Access to Sanitation Facilities in Urban and Rural Anganwadi Centers

Sanitation Facilities	Urban Area	Rural Area
Adequate	80%	60%
Inadequate	20%	40%

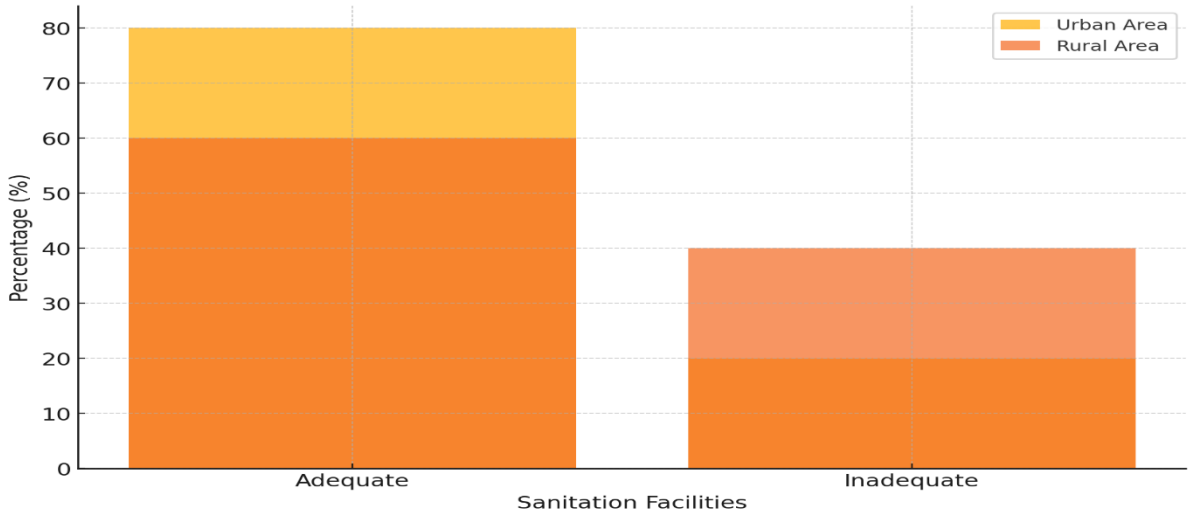

Figure 1: Sanitation Facilities by Area

Water Quality:

The safety of water including its source, storage, and treatment was assessed. The relative water quality in urban and rural Anganwadi centers is illustrated in the following figure 2. The results show the following:

Table 3: Water Quality in Urban and Rural Anganwadi Centers

Water Quality	Urban Area	Rural Area
Good	75%	50%
Poor	25%	50%

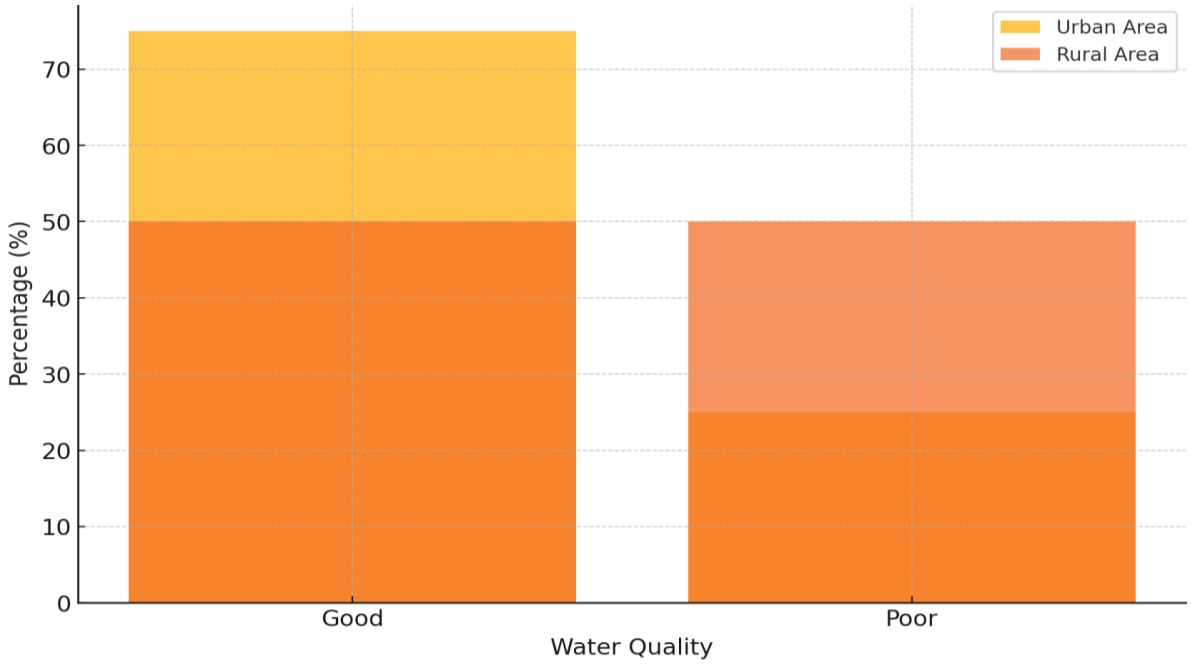

Figure 2: Water Quality by Area

Waste Management:

It also assessed waste disposal, which is important in maintaining the health of the environment. Figure 3 shown below gives a clear picture regarding proper and improper waste management between urban and rural areas. The findings are as follows:

Table 4: Waste Management Practices in Urban and Rural Anganwadi Centers

Waste Management	Urban Area	Rural Area
Proper	70%	50%
Improper	30%	50%

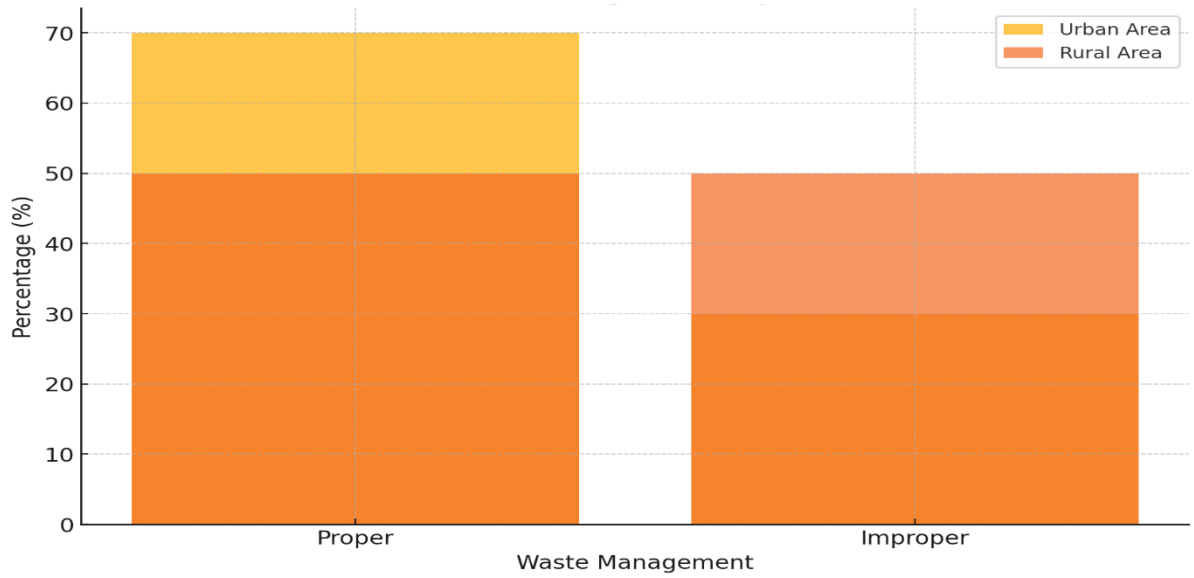

Figure 3: Waste Management by Area

Correlation between Environmental Factors and Health Outcomes

The study also tried to establish the relationship between the level of hygiene, water, and sanitation as well as the handling of wastes and the sicknesses prevailing among the children. The results are as follows:

Table 5: Correlation Between Environmental Health Factors and Childhood Illnesses in Anganwadi Centers

Factor	**Correlation with Illnesses**
Sanitation	0.72
Water Quality	0.65
Waste Management	0.58

6. Discussion

This study aimed to assess the environmental health of children enrolled in Anganwadi centers in the Gwalior city of Madhya Pradesh. The observations made gave the following insights into the study on availability and quality of sanitation facilities, water supply, and hygiene practices together with the impact they have on the health of preschooling children in these centers. Among the most important of these was the disparity in the quality of sanitation facilities provided in urban and rural Anganwadi centers. Of the centers in these urban areas, 80% had enough toilets and sanitation which is much better than the 60% of the centers in the rural areas. Such a situation goes to support the fact that there are many constraints in the rural areas especially in terms of infrastructural support.

Another important consideration in the evaluation of the environmental health status was water quality. The study established that a higher proportion of urban centers had access to good quality drinking water than rural centers at 75% and 50% respectively. This is rather worrisome because water quality is a major factor in many water-borne diseases, which in turn have been found to impact children in developing countries such as India. Contaminated water is associated with increased rates of waterborne diseases which include gastroenteritis; therefore this is a consideration in child health care policies.

In this case, there was not much difference between the urban and the rural in terms of the management of waste. As many as 70 percent of Anganwadi centres in urban areas had appropriate measures for the disposal of wastes while in rural areas, 50 percent of Anganwadi centres had appropriate disposal means. Even today, urban and rural differences remain; however, the fact that urban areas are better at managing waste than rural ones indicates that waste management can be improved in both settings, particularly in rural areas.

One of the important findings of the study was the high degree of relationship between environmental conditions and the incidence of diseases among children. The overall correlation was strongest with sanitation (0.72), water quality (0.65), and waste management (0.58). Implications from these findings include poor environmental conditions in Anganwadi centers are related to more episodes of disease hence the need to enhance sanitation, water, and waste disposal among others to improve child health.

The findings of this study are supported by previous studies carried out in other regions of India. For instance, Masthi & Pruthvi (2022) conducted a study to determine the environmental sanitation and hygiene of preschool children in Bengaluru, hence similar findings showed poor levels of sanitation and hygiene practices that affected the health of children in this area. These findings align with the findings of the present study, which shows that environmental health in Anganwadi centers is one of the most significant predictors of children's well-being in different parts of India (Masthi & Pruthvi, 2022).

A similar study was carried out by Meena *et al*., (2015) in Kolar, Madhya Pradesh: The effectiveness of Anganwadi centers in nutrition improvement of under five years of children. Their study showed that inadequate hygiene and no or

limited facilities to access clean water heavily influenced children's health. This work supports our conclusion that sanitation and water quality are critical determinants of childhood diseases and overall growth as pointed out by Meena *et al*., 2015.

Moreover, Chudasama *et al*. (2015) also undertook a study to evaluate the functioning of Anganwadi centers in Gujarat of the ICDS program. Their studies show similar issues with the unavailability of proper sanitation facilities including affecting the quality of service delivery to children. The findings of this study corroborate the need for system-level changes to the physical environment of Anganwadi centres across the country especially in rural settings to promote children's safety and quality care (Chudasama *et al*., 2015).

In addition, Debata *et al*. (2016) in their study on the status of basic amenities in rural Anganwadi centers pointed out the lack of basic infrastructure in the area and called for improved planning and resource mobilization to enhance infrastructure in such facilities. They agree with other researchers that there is an imperative for policies to address infrastructure deficits, especially in the areas of sanitation, water, and waste disposal in rural Anganwadi centers for optimal child health and development (Debata *et al*., 2016).

The findings of this study have significant policy implications for child health and policy-making in India. The study reveals that hygiene practices relating to sanitation, availability of safe water, and adequate waste disposal influence the health status of preschool children enrolled in Anganwadi centers. Since many of these environmental factors have been found to have a direct link to high incidences of childhood sickness, it will be evident that enhancing the environmental facilities of Anganwadi centers will help in decreasing child morbidity and consequently improve their health and development.

From the policy perspective, the study suggests that nutrition intervention in ICDS has to be complemented with sanitation and hygiene facilities within Anganwadi centers. Nutrition and hygiene, sanitation, and safe water should be also a part of a child health-focused approach. Policy measures could include enhancing spending on Physical infrastructure, especially Anganwadi centres in rural areas, and capacity building for Anganwadi workers on hygiene and sanitation measures. Moreover, more emphasis has to be laid on the aspects of the environmental health of the ICDS program to let the children have a clean environment for their healthy growth.

A similar emphasis has been made by Baliga & Walvekar (2017) and Debata *et al*. (2016) to enhance the Anganwadi workers' knowledge and training about sanitation and hygiene promotion. The training should therefore emphasize the need to clean the center, to have safe water for use, and proper ways of disposing of waste. These are crucial practices in case one wants to minimize the spread of waterborne diseases and many other health complications related to poor standards of the natural environment. In addition, policies should endorse the monitoring of sanitation and water quality in Anganwadi centers to ensure continuous compliance with health and safety standards (Baliga & Walvekar, 2017; Debata *et al*., 2016).

However, there are some limitations to this study that need to be taken into consideration The current study gives useful information about the environmental health status of children in Anganwadi centres in India. First, cross-sectional research design implies that the study investigators cannot establish direct linkages between environmental conditions and health status. If there is one thing that this research has been able to show with some certainty it is the relationship between environmental conditions and illnesses where the former predicts the latter. More longitudinal research is required to examine the causal link between sanitation, water quality waste management, and child health in the subsequent years.

Moreover, the study employed respondents through caregivers and Anganwadi workers, which was based on their reporting, which might incorporate socially desirable bias or recall bias. However, despite everyone's best effort to interpret and analyze the data accurately, it remains possible that respondents overemphasize good practices or underemphasize poor ones.

The second, and perhaps the most significant, limitation is the sample size, which is sufficient for the analysis, but not large enough to include all the possible variations in environmental conditions at different Anganwadi centers in Gwalior. The study was carried out in one city and although Gwalior has both urban and rural characteristics, the results cannot be generalized for other areas of Madhya Pradesh or India.

Finally, the study was confined to environmental factors only; other aspects of child health, including the nutritional status and immunization history of the children in Anganwadi centers, might also be affected by the health of children in Anganwadi centers.

7. Conclusion

In this study, the environmental health of children attending Anganwadi centers in Gwalior, Madhya Pradesh, based on sanitation, water, and waste was evaluated. It was evident that there were major differences between the urban and rural facilities; the urban facilities had relatively better sanitation, water quality, and disposal systems than their rural counterparts. The study also revealed the following high positive correlation coefficients between environmental conditions and child health; sanitation 0.72, water quality 0.65 and waste management 0.58. Such findings, therefore, support the importance of a clean and safe environment for the health of preschool children.

The following recommendations may be made to enhance the environmental health of the Anganwadi centres: First, a lot of emphasis must be placed on the improvement of the physical setting of Anganwadi centers in rural areas especially in sanitation and quality of water provided. Proper channeling of waste is also important since poor sanitation leads to diseases, thus proper management is important through investment on proper wastes management systems. Community mobilization should be conducted through Anganwadi workers and education about hygiene practices needs to be taught while environmental inspection should be regularly conducted. Further, future studies should examine the change in

magnitude of child health outcomes following environmental improvements than comparing before and after change and other potential mediating factors such as nutrition and immunization in Anganwadi centers. Stylized research that incorporates these multiple factors would go a long way in offering an all round understanding of the children in these centers.

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