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All India Institute of Local Self-Government (AIILSG), established in 1926 has been actively working in the field of urban development management and is a diligent partner in promoting the cause of local governance in India and overseas.

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Editorial

Women, wildlife, water…and more

March is a month when several crucial international observances occur. A large number of these are initiated by and celebrated under the auspices of the United Nations, which enables bring about much greater visibility among and participation from communities around the globe. Each of these observances is well-marked on their calendars by individuals, governments, non-state actors, and other stakeholders in order to bring about greater awareness and action by all around pressing issues concerning the world and its citizens. Actions initiated on these 'Days' have proved to not just to raise awareness but also trigger widespread actions to achieve our objective of a sustainable future across various spheres.

International Women's Day celebrated on March 8 each year is one of the most widely observed across nations, regions, and communities. It serves to highlight the very valuable role that women can and do play in creating a more just, fair, and equitable world for all. India has been making special efforts for many years now at all levels to ensure that women are able to realise their aspirations and lead fulfilling lives whether on the family front, or professional field. They are now playing very remarkable roles in academics, sports, government, business, and the armed forces of the country. Women are not just uplifting themselves but also raising entire communities. The profound transformation that is taking place is there for all to see. Yet more remains to be done. Women's participation in the workforce, their representation in corporate boardrooms and in leadership roles needs further improvement. This is so even when all agree on the valuable role of women in creating a more diverse, equitable, and inclusive workplace. With this year's Women's Day bringing the spotlight again on this vital subject, one is sure there will be rapid progress on all fronts.

World Wildlife Day observed on March 3 is a crucial event across the globe. It is a day to remember and celebrate the rich bio-diversity that this planet offers us in terms of its plant and animal life. These bring us valuable inputs; they support and

nurture life on this planet while providing crucial links and intricate interdependencies across plant and animal species. It is a day for us to rededicate ourselves to protection of these humble and often fragile ecosystems from human interventions which threaten them and the very existence of life on this planet. The theme this year revolved around financing - "Wildlife Conservation Finance: Investing in People and Planet" – which addresses a vital input for supporting work in the sphere of wildlife protection. The UN World Wildlife Day website states "Although USD 143 billion is invested annually in biodiversity conservation, this falls short of the estimated USD 824 billion needed each year" in order to highlight the importance of this year's theme.

World Water Day is observed on March 22. Water has a vital and central role in preserving life on this planet. There have been efforts for many years now to highlight the crucial role of water; yet the situation remains grim and extremely vulnerable. Rapid depletion of ground water, destruction of natural water bodies – rivers, lakes, and ponds, loss of green cover – all due to human activity, are putting at risk the very survival of living species on this earth. Unpredictable, uneven and inadequate rainfall is adding to the risks, putting food security, lives and livelihoods in peril. Additionally, the frequency of floods, droughts, and landslides has increased. As is evident, the issue of water and its availability has several dimensions. This year's UN World Water Day theme focusses on one: "Glacier Preservation". As has been publicly reported and discussed, our glaciers are melting faster than ever. This is a significant threat since nearly 70 percent of the world's freshwater is stored as ice. And we are drawing down on this reserve in a rapid and unsustainable manner. While on the one hand, this rapid melting of glaciers is depleting our reserves of freshwater, on the other hand, this large mass of melting ice is causing sea levels to rise in an alarming manner so much so that many coastal cities of the world (including several in India) are under threat of drowning in the next few decades. Worse, several small island countries could disappear entirely from the face of the earth. This is a frightening prospect. Among measures required is an urgent adherence to the Paris Agreement to limit temperature rise to below 1.5 percent. Progress on this has appeared uncertain and wavering. The World Water Day this year will hopefully bring back the issue of water security at the top of the table and secure firm, decisive actions by governments across the globe.

Among the UN observances in the month of March, International Day of Happiness (March 20), and International Day of Zero Waste (March 30) are some which have profound implications for the well-being of life on this planet. It is necessary for all to ensure active participation of the community to highlight the criticality of these subjects and enable success in our move towards a sustainable future.

Population Measures, Methods and Applications: Infant Mortality Rate among World Regions and Selected Countries

Manjamuthu Viruthambal Vaithilingam
Ramkhelawan R. Yadav

Abstract

Infant mortality is an important indicator for assessing the general health and welfare of a population. Health researchers and policymakers often rely on the infant mortality rate for measuring the health status of a country. A uniform measurement of infant mortality is necessary to guarantee its use and validity. Infant mortality rate is the number of deaths of infants under one year of age per 1,000 live births. This study is based on the Population Reference Bureau's data for the years 2019 and 2024. Using the bi-variate analysis and through a relevant literature review reveals that the infant mortality rate is 27 deaths under 1 year per 1,000 live births at global level. It is significantly higher in Africa (Western Africa), least developed and low-income regions, Nigeria, Pakistan. At the same time, it is much lower in Europe, more developed and high-income regions, Russia, San Marino, Lesotho, and Japan. Its increase is more in Brazil, Andorra, Niger, Lebanon and Iran; and decrease is more in Oceania, least developed and high-income countries, China, Tonga, San Marino and Laos. There is no change in IMR during 2019-2024 in Europe, more developed region, Kiribati, Oman, Kuwait, Malaysia, and Cyprus. Poverty, lower female education, lack of access to sanitation, lack of access to water, undeveloped infrastructure, malnutrition, inadequate healthcare, maternal mortality and malaria are found to have influenced the infant mortality in least developed and low-income countries; and improvements in hygiene, water quality, living conditions, and availability of midwife-led continuity of care are found to have affected the infant mortality in more developed and high-income countries. The effective implementation of existing policies and the efficiency of the innovative programmes covering health, environmental, and psychological

aspects of the mothers and children will help reducing infant mortality rate.

Key Words: Global regions, Infant mortality rate, Population reference bureau.

1.0 Introduction

Infant mortality rate is one of the important measures of child health and child development. It is also an indication of maternal and public health aspect of a population. As the children are considered the future asset of the country, there has been a keen concentration on the development of the children in terms of maternal care, prenatal and postnatal care, nutrition, education, and personal hygiene. Importance of IMR for health researchers: Infant mortality is a crucial yardstick for assessing the general health and welfare of a population. Researchers and policymakers often rely on the infant mortality rate as an indicator of a country's health. Despite arguments about its relevance, uniform measurement of infant mortality is necessary to guarantee its use as a valid measure of population health (Gonzalez and Gilleskie, 2017).

Among all the segments of population, the segment of the children is attracted much by researchers, policy makers and programme implementers as the children are the future human resource of the country or the universe. In view of this, this paper focusses on infant mortality rate, change and possible reasons among world regions and selected countries.

2.0 Literature review

The definition of infant mortality rate; classification of infant mortality; importance of study of infant mortality; causes and prevention of infant mortality; and the reasons for the significant levels, increase, and decrease of infant mortality are discussed in this section referring various literatures.

Infant mortality rate is the number of deaths of infants under one year of age per 1,000 live births (CDC, 2024a). The infant mortality can be bifurcated into prenatal mortality, neonatal mortality, and post-neonatal mortality. Perinatal mortality is late fetal death (22 weeks gestation to birth) or death of a newborn up to one week postpartum (Andrews, et. al., 2008); Neonatal mortality is death occurring within 28 days postpartum. Neonatal death is often attributed to inadequate access to basic medical care, during pregnancy and after delivery. This accounts for 40–60% of infant mortality in developing countries (Norton, 2005). Post-neonatal mortality is the death of children aged 29 days to one year. Infant mortality rate is a population-related metric that monitors the deaths of newborn (and sometimes unborn) children, a small but heartbreaking

subset of both the world's total births and total deaths per day. In countries where infant mortality is high, it can often be attributed to one or more of the following factors: poverty, malaria, malnutrition, undeveloped infrastructure, and/or inadequate health care. Notably, these are all common concerns in developed, least developed, and developing countries. Many countries with high infant mortality rates also have high birth rates and fertility rates. Around the world, the top causes of infant mortality include neonatal encephalopathy (problems with brain function due to lack of oxygen during birth), infections, complications of preterm birth, lower respiratory infections, and diarrheal diseases. The most frequent causes of death among infants that are only a few days old are different from those among older infants. Overall, the collective global infant mortality rate has significantly decreased in recent decades, dropping from approximately 140 per 1,000 live births in 1950-55 to 52.8 in 2000 and on to 27.4 in 2020 (World Population Review).

Some studies have examined the reasons for the significant level and increase of infant mortality. Conception less than six months after a birth, abortion, or miscarriage is associated with higher rates of preterm births and low birth weight, and also increases the chances of chronic and general undernutrition (Norton, 2005). Unplanned pregnancies and birth intervals of less than twenty-four months are known to correlate with low birth weights and delivery complications. Also, mothers who are already small in stature tend to deliver smaller than average babies, perpetuating a cycle of being underweight (Andrews, et. al., 2008). The major contributors to post-neonatal death are malnutrition, infectious disease, pregnancy complications, sudden infant death syndrome, and problems in the home environment (CDC, 2024a). Notably, these are all common concerns in underdeveloped, least developed, and developing countries. Many countries with high infant mortality rates also have high birth rates and fertility rates. Around the world, the top causes of infant mortality include neonatal encephalopathy (problems with brain function due to lack of oxygen during birth), infections, complications of preterm birth, lower respiratory infections, and diarrheal diseases. The most frequent causes of death among infants that are only a few days old are different from those among older infants. Overall, the collective global infant mortality rate has significantly decreased in recent decades, dropping from approximately 140 per 1,000 live births in 1950-55 to 52.8 in 2000 and on to 27.4 in 2020 (United Nations, 2024). More than 20,500 infants died in the United States in 2022. Higher infant

mortality in Asia is attributed to several factors, including maternal mortality, lack of water and sanitation, and female education (Benn and Sartorius, 2014). The five leading causes of infant death in 2022 were birth defects, pre-term birth and low birthweight, sudden infant death syndrome, unintentional injuries and maternal pregnancy complications (CDC, 2024b). In 2013, the leading cause of infant mortality in the United States was birth defects (Mathews, et. al., 2002); birth asphyxia, pneumonia, neonatal infection, diarrhea, malaria, measles, malnutrition (Women and Children First), congenital malformations, term birth complications such as abnormal presentation of the fetus, umbilical cord prolapse, or prolonged labor (Genowska, et. al., 2025); smoking during pregnancy (Hall, et. al., 2016); lack of prenatal care, alcohol consumption during pregnancy, and drug use also cause complications (CDC, 2024b); pregnant woman's level of education, environmental conditions, political infrastructure, and level of medical support (Genowska, 2015). Improving sanitation, access to clean drinking water, immunization against infectious diseases, and other public health measures can help reduce rates of infant mortality. The most common causes of death in the under age 5 category in Kiribati are - malnutrition, lower respiratory infections, asphyxia, infection, congenital abnormalities and being born too early (preterm) (UNICEF, 2013).

There have been continuous efforts in reducing infant and child mortality and improving the health status of mother and children by various government and non-government originations from time to time. Reductions in infant mortality are possible at any stage of a country's development (Bishai, et. al., 2007). Rate reductions are evidence that a country is advancing in human knowledge, social institutions, and physical capital. Governments can reduce mortality rates by addressing the combined need for education (such as universal primary education), nutrition, and access to basic maternal and infant health services. Focused policies has the potential to aid those most at risk for infant and childhood mortality, including rural, poor, and migrant populations (Farahani, et.al., 2009). Birth spacing is the time between births. Births spaced at least three years apart are associated with the lowest rate of mortality. Longer the interval between births, lower the risk of having complications at birth, or of infant, childhood, or maternal mortality (Rutsein, 2005).

3.0 Data and Method

The calculation of infant mortality rate with examples with reference to the data of the infant mortality is explained in detail in Appendix 1.

This study uses the data from the Population Reference Bureau's 2019 and 2024 World Population Data Sheets. In order to understand the levels, change and possible reasons for the significance, the geographic and economic world regions (Table 1, 4, 5), top 10 most and bottom 10 least populous countries, top 10 most and bottom 10 least IMR values in the world (Table 2), and Asian countries (Table 3) are considered in this study. The world regions by geography- Africa, Americas, Asia, Europe, and Oceania; by income - low income, middle income and high income; top 10 world most populated and top 10 least populated countries; top 10 countries and bottom 10 countries in infant mortality rate; and Asian countries.

According to the Population Reference Bureau's 2024 World Population Data Sheet, the top most populated countries in the world are: I. India (1,441.7 millions); II. China (1,408.6 millions); III. United States of America (336.6 millions); IV. Indonesia (281.6); V. Pakistan (243.5 millions); VI. Nigeria (227.8 millions); VII. Brazil (212.0 millions); VIII. Bangladesh (173.6 millions); IX. Russia (146.0 millions); and X. Ethiopia (129.7 millions); and the top 10 least populated countries are: i. Seychelles, ii. Antigua and Barbuda, iii. Curacao, iv. Dominica, v. Grenada, vi. St. Kitts and Nevis, vii. St. Vincent and the Grenadines, viii. Andorra, ix. Federated States of Micronesia, and x. Kiribati (0.1 million). The countries with most IMR are- Sierra Leone (72 deaths under 1 year per 1,000 live births), Nigeria (70), Somalia (66), Niger, Central African Republic (65), South Sudan, Chad (64), Mali (61), Guinea (59) and Lesotho (57; and the countries with least IMR are- China Hong Kong, Iceland, San Marino, Singapore, China and Macao SA (1), Japan, South Korea, Estonia, Finland and Norway (2) (PRB, 2024).

This study intends to understand the levels and change of infant mortality rate among all these regions and groups of countries with the help of bi-variate analyses, and tries to explore the possible reasons for the significant levels and change with the help of relevant available literatures.

4.0 Results and Discussion

4.1 Levels and change of IMR among world regions, and reasons

The infant mortality rate is 27 deaths under 1 year per 1,000 live births at global level. It is higher for in Africa (44) followed by Asia (21), Oceania (15), Americas (11), and Europe (4). In terms of development, it is higher for least developed countries (40) followed by less developed countries (29), and more developed countries (4); and in terms of income, it

is higher for low income countries (42), followed by middle income countries (26), and higher income countries (4).

Among the fourteen categories of countries, except more developed countries and Europe region, all the other twelve categories have showed an increase in infant mortality rate. The decline of IMR at global level is 13%. Oceania (25%) has showed a higher decline, followed by higher income countries (20%), Asia (19%), least and low-income countries (15), less developed countries (12%), middle income countries and Africa region (10%), and Americas region (8%) (Table 1).

Infant mortality rate is high in Africa due to several reasons, including lack of access to healthcare facilities and high levels of poverty (Mohammad, 2024). Food insecurity and hunger is another primary cause of infant mortality in Africa (World Atlas, 2024). Other factors include insufficient numbers of physicians, higher rates of HIV/AIDS, inadequate education, poor economic development, and low levels of maternal education (UN Chronicle, 2007). In Africa, at least 25% of all deaths in children under-five occur within the first month, with causes including infection, asphyxia, and preterm and low birth weight (Mason, 2007). Maternal mortality, lack of access to sanitation, lack of access to water, and lower female education are the most prominent attributable risk factors for infant mortality in least developed and low-income countries of the world (Sartorius and Sartorius, 2014). At the individual level, maternal- and child-related factors were revealed to influence infant mortality; socioeconomic and sociocultural factors at the interpersonal level; provision and utilization of health services, health workforce, hospital resources and access to health services at the organizational level; housing/neighborhood and environmental factors at the community level; and lastly, governmental factors were found to affect infant mortality at the public policy level in Nigeria (Nwanze, et. al., 2023). The reasons for higher infant mortality in Pakistan are the delay in the salary disbursements, stock-outs of medicines, unavailable and dysfunctional equipment, unhelpful referral system, lack of knowledge about expecting mothers' health and proper care, and no monitoring in rural health mission, have been attributed (VOA News, 2014). The positive trend of Singapore's infant mortality rate can broadly be attributed to improvements in hygiene, water quality, and living conditions, and availability of midwife-led continuity of care (MLCC) from professional midwives according to international standard that reduced the spread of infections (United Nations, 2024).

4.2 Levels and change of IMR among most populated and least populated countries, and reasons

Among the top and 10 bottom (23.9 deaths under 1 year per 1000 live births) 10 countries in world population (15.4), the IMR ranges from a high of 70 in Nigeria to a low of 1.1 in San Marino followed by Pakistan (49), Kiribati (43), Bangladesh and India (23), Marshall Islands (22), Federated States of Micronesia (19), Palau (18), Indonesia (17), Tuvalu (16) and so on. The bottom 10 countries have spelled more decline (15.3%) as compared to top 10 countries (14.2%) in IMR. The countries such as Nigeria (4.5), Brazil (20), Bangladesh (4.5), Andorra (55.9), Liechtenstein (43.2), and Palau (5.9) have showed an increase, whereas, Kiribati has showed no change in the IMR during 2019-2024 (Table 2).

Infant mortality is higher in Nigeria due to- Neonatal disorders, which accounted for 25% of all deaths among children aged under five in Nigeria in 2019. Lower respiratory infections, diarrheal diseases, and malaria; Low birth weight, lack of antenatal care, maternal illness, mother's age, prematurity, and birth asphyxia; Lack of access to healthcare; Key socioeconomic and geographic characteristics, such as mother's poor education, poverty, sex of child, age of mother, and location (rural vs urban) (Nwanse and et. al., 2023). The factors influenced higher IMR in Pakistan are premature births, high prevalence of birth defects, lack of vaccination, unsafe deliveries, poor breastfeeding practices, complications during delivery, sudden infant death syndrome (SIDS), poor socioeconomic conditions, and a struggling healthcare system. The government should invest in healthcare by hiring more physicians and providing better supplies and improving infrastructure; and telemedicine should be made common in order to provide easy access to women who cannot visit the hospital (Tharwani, et. al., 2023).

4.3 Levels and change of IMR among countries with most IMR and least IMR, and reasons

Among the top 10 countries (64.3 deaths under 1 year per 1000 live births) with higher levels of IMR, it is higher (72) in Sierra Leone followed by Nigeria (70), Somalia (66), Niger and Central African Republic (65), South Sudan and Chad (64), Mali (61), Guinea (59), and Lesotho (57). Among countries with lowest levels of IMR (2), it ranges from 1.1 in San Marino to 2.4 in Portugal. The increase in IMR is higher in Niger (38%) followed by Sierra Leone (29%), Mali (13%), Lesotho (7%), Sweden (5%), and Nigeria (4%), whereas, the decline is higher in San Marino (74), North Macedonia (66.7%), Iceland (48.1%),

Portugal (25%), Central African Republic (22%), Italy (17%), Belarus (16%), Norway (13%), Chad (12%), Czechia (11%), Guinea (11%), Somalia (6%), and South Sudan (1%) (Table 2).

The reasons for higher infant mortality in Sierra Leone are lower income, lower education, and the worst healthcare system (Gilbert, 2023). The factors associated with higher infant mortality in Somalia are duration of pregnancy, sex of the child, antenatal visits and multiple births. Since infant death is a major public health problem, intervention programmes should focus on providing antenatal care services for pregnant women, especially those who are becoming mothers for the first time. Pregnant women can benefit from antenatal care by learning about good pregnancy practices from trained medical personnel, recognizing the warning signs of pregnancy and childbirth, and receiving social, emotional, and psychological support during this critical time in their life (Ali, et. al., 2024).

4.4 Levels and change of IMR among Asian countries, and change

Asia has recorded infant mortality rate 21 deaths under 1 year per 1,000 live births in 2024. It is highest in Pakistan (49) followed by Afghanistan and Timor-Leste (46), Yemen (35), Turkmenistan (32), Nepal (28), Laos and Myanmar (25), Bangladesh, India and Tajikistan (23), Philippines (22) and so on. Whereas, Japan has recorded the lowest IMR (1.8) followed by Singapore and South Korea (2), Israel and Cyprus (3), United Arab Emirates, Qatar, Taiwan and Russia (4), Saudi Arabia, China and Bahrain (5), Malaysia (6), Armenia, Thailand, Sri Lanka, and Kuwait (7), Kazakhstan, Georgia, and Uzbekistan (8-8.5) and so on. As far as the increase of IMR is concerned, Iran has recorded 100 % followed by Lebanon (78%), Azerbaijan (64%), Timor-Leste (53%), North Korea (33%), Bhutan (26%), Brunei (16%) and so on. Saudi Arabia has recorded a decrease of 61% followed by China (50%), Maldives (44%), United Arab Emirates (38%), Laos (37%), Myanmar (36%), Qatar (35%), India (30%), Uzbekistan (23%), Turkmenistan (27%), Sri Lanka and Thailand (22%), Pakistan (21%), Cambodia (21%) and so on (Table 3).

The extremely high infant mortality rate in Afghanistan is largely due to inadequate access to health care for women and mothers. Women often have to give birth at home without a doctor or with non-skilled birth attendants, which harms the baby's chances at life. Not only is there a lack of health care professionals, but there is a lack of health care facilities in Afghanistan as well. More than 10% of Afghans have to travel more than two

hours to reach a medical facility, leaving a lot of mothers in an unsanitary birthing environment. On top of that, illness, infection and poor nutrition couple together to create a rough environment for a newborn baby (Breitbach, 2023). The contributing factors for low IMR in Japan are - universal use of the Boshi Kenko Techo and universal access to care, most births to women aged 25-29 years and few unmarried mothers, most births (99%) attended by qualified professionals either in hospitals or private clinics, with an average stay of one week postpartum, availability of abortion option when contraceptives fail, availability of government subsidies for medical, obstetric, and pediatric complications, high literacy among senior citizens seeking medical advice, and organized set-up to support children, efficient systems of community support, public health education, and excellent medical care encompass events from conception to school age (Leppert, 1993). The reasons for high IMR in India are - ailing of public health system, under-funded, and non-responsive, low spending on healthcare (1.1% of its GDP), more health spending (75%) on healthcare from out of pocket expenditure, low educational status, poor literacy, and inadequate government investment for health (Sofi, 2020). Parental education has been found to be the effective reason for the higher decline of IMR in Saudi Arabia (Al-Mazrou, et. al., 2008).

5.0 Conclusions and Suggestions

The infant mortality rate is 27 deaths under 1 year per 1,000 live births at global level. It is pronounced higher in Africa (Western Africa), least developed and low-income regions, Nigeria, Pakistan. It is pronounced low in Europe, more developed and high-income regions, Russia, San Marino, Lesotho, and Japan. Its increase is more in Brazil, Andorra, Niger, Lebanon and Iran; and decrease is more in Oceania, least developed and high-income countries, China, Tonga, San Marino and Laos. There is no change in IMR during 2019-2024 in Europe, more developed region, Kiribati, Oman, Kuwait, Malaysia, and Cyprus. Poverty, lower female education, lack of access to sanitation, lack of access to water, undeveloped infrastructure, malnutrition, inadequate healthcare, maternal mortality and malaria found to have influenced the infant mortality in least developed and low-income countries; and improvements in hygiene, water quality, living conditions, and availability of midwife-led continuity of care found to have affected the infant mortality in more developed and high-income countries. The effective implementation of existing policies and the efficiency of the innovative programmes covering health, environmental, and psychological aspects of the mothers and children will help reducing infant mortality rate.

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Table 1. Infant mortality rate (IMR) and percent change, countries with most population, least population, most IMR and least IMR, Population Reference Bureau, 2019-2024

Sr.#	*World/ Regions/ Countries*	*IMR*		*% Change*
		2024	*2019*	*2019-2024*
	WORLD	27.0	31.0	-12.9
I	*Africa*	44.0	49.0	-10.2
II	*Asia*	21.0	26.0	-19.2
III	*Americas*	11.0	12.0	-8.3
IV	*Oceania*	15.0	20.0	-25.0
V	*Europe*	4.0	4.0	0.0
I	Africa	44.0	49.0	-10.2
1	*Western Africa*	59.0	60.0	-1.7
2	*Middle Africa*	50.0	64.0	-21.9
3	*Eastern Africa*	35.0	44.0	-20.5
4	*Southern Africa*	25.0	25.0	0.0
5	*Northern Africa*	23.0	23.0	0.0
II	Americas	11.0	12.0	-8.3
1	*Caribbean*	25.0	32.0	-21.9
2	*Central America*	15.0	15.0	0.0
3	*Southern America*	12.0	13.0	-7.7
4	*Northern America*	6.0	6.0	0.0
III	Asia	21.0	26.0	-19.2
1	*South Asia*	28.0	36.0	-22.2
2	*Western Asia*	18.0	19.0	-5.3
3	*South-East Asia*	17.0	22.0	-22.7
4	*East Asia*	5.0	9.0	-44.4
5	Central Asia	3.2	16.0	-80.0
IV	Europe	4.0	4.0	0.0
1	*Eastern Europe*	4.0	5.0	-20.0
2	*Western Europe*	3.0	3.0	0.0
3	*Southern Europe*	3.0	3.0	0.0
4	*Northern Europe*	3.0	3.0	0.0
1	*Least Developed*	40.0	47.0	-14.9
2	*Less Developed*	29.0	33.0	-12.1
3	*More Developed*	4.0	4.0	0.0
A	Low Income	42.0	49.0	-14.3
B	Middle Income	26.0	29.0	-10.3
C	High Income	4.0	5.0	-20.0

Table 2. Infant mortality rate (IMR) and percent change, countries with most population, least population, most IMR and least IMR, Population Reference Bureau, 2019-2024

Sr.#	*Country*	IMR		% Change 2019-2024			IMR		Change 2019-2024
		2024	2019				2024	2019	
A	***Countries with most population***	**23.9**	**27.8**	**-14.2**	*B*	***Countries with least population***	**15.4**	**19.6**	**-15.3**
1	India	23.0	33.0	-30.3	1	Fed. State. Micronesia	19.0	29.0	-34.5
2	China	5.0	10.0	-50.0	2	Kiribati	43.0	43.0	0.0
3	United States	5.6	5.8	-3.4	3	Tonga	3.2	17.0	-81.2
4	Indonesia	17.0	25.0	-32.0	4	Nauru	21.0	35.0	-40.0
5	Pakistan	49.0	62.0	-21.0	5	Tuvalu	16.0	21.0	-23.8
6	Nigeria	70.0	67.0	4.5	6	Palau	18.0	17.0	5.9
7	Brazil	12.0	10.0	20.0	7	Liechtenstein	5.3	3.7	43.2
8	Bangladesh	23.0	22.0	4.5	8	Andorra	5.3	3.4	55.9
9	Russia	4.4	5.1	-13.7	9	San Marino	1.1	4.3	-74.4
10	Ethiopia	30.0	38.0	-21.1	10	Marshall Islands	22.0	23.0	-4.3
C	***Countries with most IMR***	**64.3**	**63.4**	**4.0**	*D*	***Countries with least IMR***	**2.0**	**3.1**	**-28.2**
1	Sierra Leone	72.0	56.0	28.6	*1*	San Marino	1.1	4.3	-74.4
2	Nigeria	70.0	67.0	4.5	*2*	Iceland	1.4	2.7	-48.1
3	Somalia	66.0	70.0	-5.7	*3*	Portugal	2.4	3.2	-25.0
4	Niger	65.0	47.0	38.3	*4*	North Macedonia	2.0	6.0	-66.7
5	Central African Republic	65.0	83.0	-21.7	*5*	Italy	2.3	2.8	-17.9
6	South Sudan	64.0	65.0	-1.5	*6*	Czechia	2.3	2.6	-11.5
7	Chad	64.0	73.0	-12.3	*7*	Belarus	2.1	2.5	-16.0
8	Mali	61.0	54.0	13.0	*8*	Sweden	2.1	2.0	5.0
9	Guinea	59.0	66.0	-10.6	*9*	Norway	2.0	2.3	-13.0
10	Lesotho	57.0	53.0	7.5	*10*	Finland	1.8	2.1	-14.3

Table 3. Infant mortality rate (IMR) and percent change, Asian countries, Population Reference Bureau, 2019-2024

Sr.#	Asia/ Country	IMR		% Change 2019-2024	Sr.#	Asia/ Country	IMR		% Change 2019-2024
		2024	2019				2024	2019	
III	Asia	21.0	26.0	-19.2					
1	Pakistan	49.0	62.0	-21.0	26	Brunei	10.4	9.0	15.6
2	Afghanistan	46.0	53.0	-13.2	27	Iran	10.0	5.0	100.0
3	Timor-Leste	46.0	30.0	53.3	28	Maldives	10.0	18.0	-44.4
4	Yemen	35.0	43.0	-18.6	29	Turkey	10.0	9.0	11.1
5	Turkmenistan	32.0	44.0	-27.3	30	Oman	9.0	9.0	0.0
6	Nepal	28.0	29.0	-3.4	31	Uzbekistan	8.5	11.0	-22.7
7	Laos	25.0	40.0	-37.5	32	Georgia	8.2	8.0	2.5
8	Myanmar	25.0	39.0	-35.9	33	Kazakhstan	8.0	9.0	-11.1
9	Bangladesh	23.0	22.0	4.5	34	Kuwait	7.0	7.0	0.0
10	India	23.0	33.0	-30.3	35	Sri Lanka	7.0	9.0	-22.2
11	Tajikistan	23.0	27.0	-14.8	36	Thailand	7.0	9.0	-22.2
12	Philippines	22.0	21.0	4.8	37	Armenia	6.8	7.0	-2.9
13	Bhutan	19.0	15.0	26.7	38	Malaysia	6.0	6.0	0.0
14	Cambodia	19.0	24.0	-20.8	39	Bahrain	5.0	6.0	-16.7
15	Iraq	19.0	23.0	-17.4	40	China	5.0	10.0	-50.0
16	Azerbaijan	18.1	11.0	64.5	41	Saudi Arabia	5.0	13.0	-61.5
17	Indonesia	17.0	25.0	-32.0	42	Russia	4.4	5.1	-13.7
18	Syria	17.0	16.0	6.3	43	Taiwan	4.3	4.2	2.4
19	Lebanon	16.0	9.0	77.8	44	Qatar	3.9	6.0	-35.0
20	North Korea	16.0	12.0	33.3	45	United Arab Emirates	3.7	6.0	-38.3
21	Palestine	16.0	18.0	-11.1	46	Cyprus	3.0	3.0	0.0
22	Jordan	14.0	17.0	-17.6	47	Israel	2.6	3.1	-16.1
23	Kyrgyzstan	14.0	15.0	-6.7	48	South Korea	2.3	2.8	-17.9
24	Mongolia	12.0	13.0	-7.7	49	Singapore	2.2	2.0	10.0
25	Vietnam	12.0	14.0	-14.3	50	Japan	1.8	1.9	-5.3

Table 4: World regions and countries by increase, decrease and no change of IMR

Sr.#	Countries with decrease	Sr.#	Countries with increase	Sr.#	Countries with no change
	WORLD				
I	*Least Developed*				
II	*Less Developed*				
				III	More developed region
i.	Low Income				
ii.	Middle Income				
iii.	High Income				
A	*Africa*				
B	*Asia*				
C	*Americas*				
				D	Europe
E	*Oceania*				
1	Afghanistan	1	Andorra	1	Cyprus
2	Armenia	2	Azerbaijan	2	Kiribati
3	Bahrain	3	Bangladesh	3	Kuwait
4	Belarus	4	Bhutan	4	Malaysia
5	Cambodia	5	Brazil	5	Oman
6	Central African Republic	6	Brunei		
7	Chad	7	Georgia		
8	China	8	Iran		
9	Czechia	9	Lebanon		
10	*Ethiopia*	10	Lesotho		
11	Fed. State. Micronesia	11	Liechtenstein		
12	Finland	12	Mali		
13	Guinea	13	Niger		
14	Iceland	14	Nigeria		
15	India	15	North Korea		
16	Indonesia	16	Palau		
17	Iraq	17	Philippines		
18	Israel	18	Sierra Leone		
19	Italy	19	Singapore		
20	Japan	20	Sweden		

Table 4: World regions and countries by increase, decrease and no change of IMR

Sr.#	Countries with decrease	Sr.#	Countries with increase	Sr.#	Countries with no change
21	Jordan	21	Syria		
22	Kazakhstan	22	Taiwan		
23	Kyrgyzstan	23	Timor-Leste		
24	Laos	24	Turkey		
25	Maldives				
26	Marshall Islands				
27	Mongolia				
28	Myanmar				
29	Nauru				
30	Nepal				
31	North Macedonia				
32	Norway				
33	Pakistan				
34	Palestine				
35	Portugal				
36	Qatar				
37	*Russia*				
38	San Marino				
39	Saudi Arabia				
40	Somalia				
41	South Korea				
42	South Sudan				
43	Sri Lanka				
44	Tajikistan				
45	Thailand				
46	Tonga				
47	Turkmenistan				
48	Tuvalu				
49	United Arab Emirates				
50	United States				
51	Uzbekistan				
52	Vietnam				
53	Yemen				

Table 5: List of selected countries with their 3-letter alpha code by region

Sr.#	Country	Alpha Code	Region	Sr.#	Country	Alpha Code	Region
1	Afghanistan	AFG	Southern Asia	42	Marshall Islands	MHL	Oceania
2	Andorra	AND	Southern Asia	43	Mongolia	MNG	Eastern Asia
3	Armenia	ARM	Western Asia	44	Myanmar	MMR	South Eastern Asia
4	Azerbaijan	AZE	Western Asia	45	Nauru	NRU	Oceania
5	Bahrain	BHR	Western Asia	46	Nepal	NPL	Southern Asia
6	Bangladesh	BGD	Southern Asia	47	Niger	NER	Western Africa
7	Belarus	BRB	Eastern Europe	48	Nigeria	NGA	Western Africa
8	Bhutan	BTN	Southern Asia	49	North Korea	PRK	Eastern Asia
9	Brazil	BRA	South America	50	North Macedonia	MKD	Southern Europe
10	Brunei	BRN	South Eastern Asia	51	Norway	NOR	Northern Europe
11	Cambodia	KHM	South Eastern Asia	52	Oman	OMN	Western Asia
12	Central African Republic	CAF	Middle Africa	53	Pakistan	PAK	Sothern Asia
13	Chad	TCD	Middle Africa	54	Palau	PLW	Oceania
14	China	CHN	Eastern Asia	55	Palestine	PSE	Western Asia
15	Cyprus	CYP	Western Asia	56	Philippines	PHL	South Eastern Asia
16	Czechia	CZE	Eastern Europe	57	Portugal	PRT	Southern Europe
17	Ethiopia	ETH	Eastern Africa	58	Qatar	QAT	Western Asia
18	Fed. State. Micronesia	FSM	Oceania	59	Russia	RUS	Eastern Europe
19	Finland	FIN	Northern Europe	60	San Marino	SMR	Southern Europe
20	Georgia	GEO	Western Asia	61	Saudi Arabia	SAU	Western Asia
21	Guinea	GIN	Western Africa	62	Sierra Leone	SLE	Western Africa
22	Iceland	ISL	Northern Europe	63	Singapore	SGP	South East Asia
23	India	IND	Southern Asia	64	Somalia	SOM	Eastern Africa
24	Indonesia	IDN	South Eastern Asia	65	South Korea	KOR	Eastern Asia
25	Iran	IRN	Southern Asia	66	South Sudan	SDN	Eastern Africa
26	Iraq	IRQ	Western Asia	67	Sri Lanka	LKA	Southern Asia
27	Israel	ISR	Western Asia	68	Sweden	SWE	Northern Europe
28	Italy	ITA	Southern Europe	69	Syria	SYR	Western Asia
29	Japan	JPN	Eastern Asia	70	Taiwan	TWN	Eastern Asia
30	Jordan	JOR	Western Asia	71	Tajikistan	TJK	Central Asia
31	Kazakhstan	KAZ	Central Asia	72	Thailand	THA	South Eastern Asia
32	Kiribati	KIR	Oceania	73	Timor-Leste	TLS	South Eastern Asia
33	Kuwait	KWT	Western Asia	74	Tonga	TON	Oceania
34	Kyrgyzstan	KGZ	Central Asia	75	Turkey	TUR	Western Asia
35	Laos	LAO	South Eastern Asia	76	Turkmenistan	TKM	Central Asia
36	Lebanon	LBN	Western Asia	77	Tuvalu	TUV	Oceania
37	Lesotho	LSO	Southern Africa	78	United Arab Emirates	ARE	Western Asia
38	Liechtenstein	LIE	Western Europe	79	United States	USA	Northern America
39	Malaysia	MYS	South Eastern Asia	80	Uzbekistan	UZB	Central Asia
40	Maldives	MDV	Southern Asia	81	Vietnam	VNM	South Eastern Asia
41	Mali	MLI	Western Africa	82	Yemen	YEM	Western Asia

Appendix 1

Calculation of Infant Mortality Rates

Infant mortality rate (IMR): Computed by dividing the number of infant deaths in a calendar year by the number of live births registered for the same period. IMR is the most widely used index for measuring the risk of dying during the first year of life (Danielle and Anne, 2024, p.6). Infant mortality comprises deaths occurring during the first year of life, and is customarily expressed as a ratio of the number of infant deaths in a given period to the number of live births during the same period or related in some other way to the infant deaths. Methods of calculation of infant mortality rate: I. Exact matching of births and deaths- (a) whole year matching, (b) part year matching, (1) Additive technique, (2) Multiplicative technique; II. Appropriate matching of births and deaths- (a) Whole year matching, (b) part year matching, (1) Numerator separation, (2) Denominator adjustment; and III. (1) (i) by numerator separation factor (f), (ii) by denominator adjustment factor, (iii) by denominator adjustment utilizing numerator separation factor (f used as r), (2) separation factor based on postnatal/ total infant mortality ratio, and separation factor estimated from total infant mortality rate by regression formula (Logan, 1953).

1. Infant mortality rate through Direct method

An example of calculation of Infant Mortality Rate of the USA for the year 2022 is given below by using the data given in Table A1.

Table A1. Live births, infant deaths and infant deaths per 1,000 live births, United States, 1995-2022

Year	Live births	Infant deaths	Infant deaths per 1,000 live births
2022	3667758	20577	5.61
2021	3664292	19928	5.44
2011	3953590	24001	6.07
2001	4026036	27523	6.84
1995	3899589	29505	7.57

Source: Danielle and Anne (2024, p. 8)

$$\frac{Number\ of\ deaths\ of\ infants\ under\ age\ 1\ in\ the\ USA\ in\ 2022}{Total\ live\ births\ in\ the\ USA\ in\ 2022} * K = \frac{20577}{3667758} * 1{,}000 = 5.61$$

2. Infant mortality rate through Indirect methods

Calculation of Infant Mortality Rate through (1) Conventional method, (2) Adjusted method- Addictive method, (3) Adjusted method- Multiplicative method, (4) Adjusted method- Numerator adjusted method, and (5) Adjusted method- Denominator adjusted method (by using the data of live births of three successive years, and infant deaths which belong to the birth cohort of the same year and of the previous year)

Table A2: Live births and infant deaths by year and cohort, Japan 1994

Table A2: Live births and infant deaths by year and cohort, Japan 1994					
i	**Year**	**Live births**	**Infant deaths**		
			Birth cohort of the same year (d_i')	**Birth cohort of the previous year (d_i'')**	**Total ($d_i = d_i' + d_i''$)**
1	1993	1,188,282 (b_0)	4164 (d_0')	1005 (d_0'')	5169 (d_0)
2	1994	1,238,328 (b_1)	4272 (d_1')	989 (d_1'')	5161 (d_1)
3	1995	1,186,797 (b_2)	4020 (d_2')	1034 (d_2'')	5054 (d_2)

Source: United Nations (1996, p.464-465)

(1) Conventional method

$$\frac{d' + d1''}{b1} * K = \frac{4{,}272 + 989}{1{,}238{,}328} * 1{,}000 = 4.25\ per\ 1{,}000\ live\ births$$

(2) Adjusted method- Additive method

$$= \frac{d1'}{b1} + \frac{d1''}{b0} * K = \frac{4{,}272}{1{,}238{,}328} + \frac{989}{1{,}188{,}282} * 1000 = 4.28\ per\ 1{,}000\ live\ births$$

(3) Adjusted method- Multiplicative method

$$= [1 - \left(\frac{b1 - d1'}{b1}\right) * (\frac{b0 - d0' - b"1}{b0 - b'0} * K$$

$$= [-\left(\frac{1{,}238{,}328 - 4272}{1{,}127{,}217}\right) * (\frac{1{,}188{,}282 - 4164 - 989}{1{,}188{,}282 - 4164} * 1000$$

$$= [1 - (0.996550) * (0.999165)] * 100 = 4.28\ per\ 1{,}000\ live\ births$$

(4) Adjusted method- Numerator method

$$= [\frac{f.d1}{b0} + \frac{(1-f)d1}{b1}] * K$$

$$\textit{Where, } f = [\frac{d1"}{d1'} + d1" = \frac{d1'}{d1} = [\frac{989}{4{,}272+989} = 0.187987$$

$$= [\frac{0.18798 * 5261}{1{,}188{,}282} + \frac{0.8120129*526}{1{,}238{,}328}] * 1{,}000$$

= 4.28 per 1,000 live births.

(5) Adjusted method- Denominator method

$$= [\frac{d1}{fbo+(1-f)b1} * K$$

$$= [\frac{5{,}261}{0.187987*1{,}188{,}282+0.8120129*1{,}238{,}328} * 1{,}000$$

= 4.28 per 1,000 live births.

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Review of Existing System and Policies in Agriculture Water

Deepak Kokate

1.1 Introduction.

In India, agricultural industry employs more than 50% of the work force and contributes to a bit less than 20% of the national GDP. The industry accounts for 18% of the total electricity use in Indian power sector. State utilities comprise rural loads consisting mainly of agricultural feeders are critical to maintain with reliability and stability due to abortive infrastructure and inefficient pumping system which leads to higher distribution & transmission losses. In addition, central and state governments allocate large funds to subsidize power and reduction of tariff on agriculture feeder puts further burden on state utilities in terms of financial challenges and recovery. Since electricity is concurrent subject it has been mostly driven by the state government. Agriculture pumping is a politically influenced issue hence the tariff determined is either very low or virtually free in many of the states. To gear up to the challenges in and effective manner, various benefits to state utilities from local smart grid solution to be provided such as energy management with arbitrage, real time analysis of data, user interface for monitoring and control, etc., in existing agriculture feeder are necessary which can bring down the financial implications and improve the state distribution companies' situation.

This work has traced the evidence and current situation about the way an important piece of policy issue pertaining to the conservation and optimum utilization of available resources viz. electricity and groundwater for agriculture use. Agricultural pumping is an important and vital subject in national economy and has had multifaceted impacts on the livelihood of masses and sustainability. Growing primary fuel crisis and inadequate electricity generation, since the peak demand - supply gap for electricity in the country

is widening (about 12%) and the retail electricity tariff are also being increased by 3-5 % year on year, energy required for agricultural pumping has a significant role from the point of sustainability. Energy required only for agriculture water pumping is about 26% to the total electricity needed of the country[1]. The increasing population (17.64 % during 2001 2011) in the country and disposable income are creating additional pressure on the production of agricultural goods. Increased food production will be driven by mechanization and irrigation [2]. Over the next decade, India will become increasingly mechanized as technology becomes more prevalent and dependent. Agricultural energy is largely provided by electricity, which includes the following:

1. It consumes approximately one third of the electricity produced in the country (generation).
2. Accounts for only 8-10% of revenue from sale of electricity.
3. Contributes 334 million tonnes of carbon dioxide to the atmosphere each year (MoEF 2010).

In India, there are approximately 22 million electric pump sets in operation. Each year, approximately one million tube wells and borewells are installed.

In Figure 2.1, energy use is projected to increase rapidly as a result of the projected growth of pumps and farm machinery[2]. It is estimated that more than 70 % of the total pumps are of nonstandard and unbranded type, which are highly energy inefficient. This is the sector where highest energy saving potential (35-50 %) is possible but is very complex to target & implement. In India about 20 million agriculture consumers are spread across the geographical area of the country with their distributed load ranging from 3 HP to 50 HP, thus monitoring and controlling their energy usage may not be a simple task. This work deliberates on the issues and difficulties to be addressed by the different stake holders in order to target & realise the energy conservation potential. The management of electricity from supply side and Demand Side Management (DSM) gives a permeable solution to Energy Conservation and optimum utilization of the Country's resources.

Energy and water are in a state of global crisis, but the scale of energy requirement for the groundwater use in India is very different and various different methods are being used. India is among the major countries of the world in usage of electricity for ground water pumping. The rural/agricultural sector in India uses 85% of the country's available fresh water resources. However, irrigation efficiency is only 20-50%. In other words, Indian agriculture wastes up to half of the country's fresh water supply. The performance of the state power

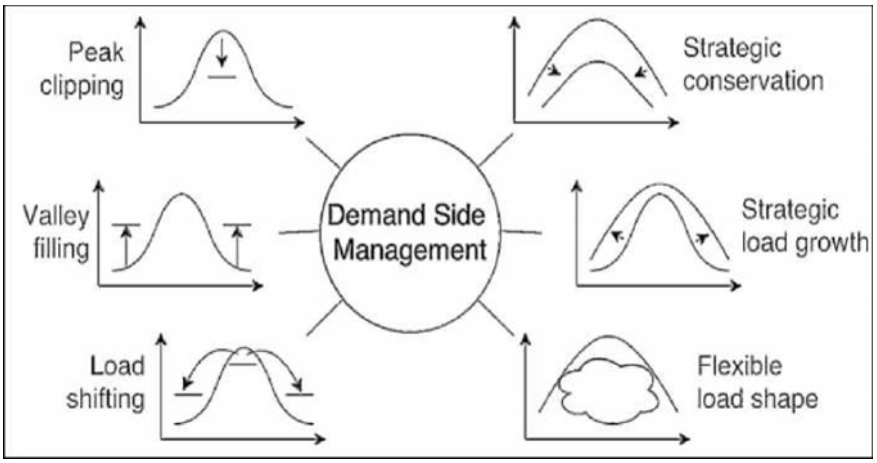
sector is increasingly dependent on how efficiently the irrigation water is used and paid for. Water pumping for agriculture is an energy intensive operation, which results in highest power consumption. Ground water now accounts for 70 % of the irrigated area in India that grew by 8 % yearly during 1970-2007, while agriculture electricity use grew 22 times. India has the largest number of agriculture pumps in the world, where these alone make up about 26% of the electricity consumption. Poor quality of agriculture power is one of the reasons for low crop yields and the prime reason for low efficiency of pump sets. This results in lowering of farmers' income and dissatisfaction, which results in the farmer community resisting revisions in electricity tariffs. Highly subsidized power tariff policies for agriculture have major implications for the overall condition of the power sector and associated water resource. There is no underground water usage policy and water rights are passed on with the rights of land. Economic defines the low marginal cost of pumping and low marginal returns on abundant & wasteful use of water which results in ground water tables/ levels sinking deeper and deeper. It has adverse implications on the availability of drinking water and associated impact on environmental degradation & sustainability. As a result of uncontrolled pumping of water, the World Bank warns that all of India's aquifers will be in a perilous position by 2030. The nation's 5,723 water stress assessment units (Blocks/Mandals/Talukas) are categorized as overexploited in 839 cases, critical in 226 cases, and semi-critical in 550 cases. About 80% of these threatened areas are located in peninsular India (World Bank 2005; ADB 2007; IEI 2010), as well as western India (Rajasthan, Punjab, Gujarat, and Haryana).

1.2 Demand Side Management (DSM) Definition and Rationale

"Demand-Side Management can be defined as the selection, planning, and implementation of measures intended to have an influence on the demand or customer-side of the electric meter, either caused directly or stimulated indirectly by the utility." In the Power Sector, DSM is mainly based on the fact that investing in efficiency and other demand side measures is often more cost-effective and socially beneficial than increasing power supply or transmission capacity when it comes to reducing or managing electricity demand.

Following Figure 1.1 shows the various DSM measures or techniques to be implemented in order to manage the load curve for economic operation of the power system.

Figure 1.1:- DSM Techniques for effective load management.



1.2.1 Peak Clipping: When the electricity demand is high, there is a sudden spike in the load curve. Peak clipping is employed to curtail the system peak loads. Usually, peak loads are reduced using the direct load control (DLC) method.

1.2.2 Load Shifting: Load shifting deals with the shifting of loads from peak to off-peak periods. This facilitates the decrease in peak demand, but the total electricity consumption remains the same.

1.2.3 Valley Filling: Valley filling refers to increasing load consumption during off-peak periods and flattening the load curve. An example of valley filling is charging the electric vehicles (EVs) at night when the electricity demand is less.

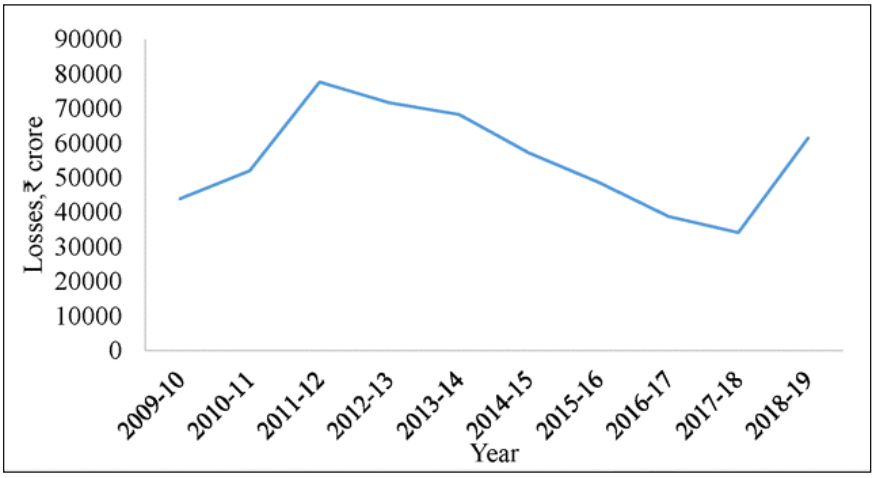
1.2.4 Strategic Conservation: Strategic conservation employs utility-designed programs to induce a change in the shape of the load curve. These programs target the customers by offering them certain benefits to improve equipment efficiency, reduce waste, and change their consumption patterns.

1.2.5 Strategic Load Growth: It refers to increasing the loads through strategic additions beyond valley filling through intelligent systems and processes and more efficient equipment. DSM programs reduce the need for additional generating capacity and distribution facilities at peak or base loads.

1.3 Review of Existing Electricity Distribution

As per the enactment of the Indian Electricity Act, the erstwhile Electricity Boards has been unbundled in to three separate corporations, whose responsibility was to perform within the frame-work of the EA 2003. Three independent corporations like GENCO looking after generation of electricity business only, TRANSCO looking after transmission of electricity only and DISCOM looking after the distribution of electricity only. DISCOMs are suffering the huge technical & commercial losses hence their financial viability is an issue. The distribution network is stressed and contributes to the high level of T&D (Transmission & Distribution) losses in the power system. The stress can be substantially reduced by increasing the penetration of distributed generation and off grid generation especially through renewable energy resources. This is considered the weakest link in the electricity sector's value chain. Existing electricity distribution in India should provide insights into areas of strengths, weaknesses, and opportunities for enhancement, guiding policy formulation, investment prioritization, and operational improvements in the sector.

Figure 1.2: Total DISCOM losses (after tax, with tariff subsidy received) over time[3,4]



In above figure 1.2, it is observed that the losses of the DISCOMs declined from a peak of Rs 76,878 crore in 2011-12 to Rs 33,596 crore in 2017-18. However, losses increased sharply in 2018-19. The Covid-19 pandemic and the subsequent lockdown further damaged the DISCOM's finances. Due

to its adverse impact, the electricity demand of commercial and industrial (C&I) customers also suffered.

1.4 Agricultural Demand Management

Agriculture-DSM (Agriculture Demand Side Management) was first implemented by BEE during the XI plan. Through the efficiency upgrade of agricultural pump sets, the programme aims to reduce agricultural pumping's energy intensity. About 19 million pump sets are estimated to exist, and 2.5 to 5 lakh new pump sets are being added each year. Due to low electricity tariffs for agriculture consumers, farmers are not motivated to invest in higher cost, higher efficiency pump sets. The State Government has been burdened with a subsidy burden of over Rs 65,000 crore per year as a result. Energy efficient pump sets can save 30%-40% on energy in the agriculture sector, according to studies. BEE's Agriculture DSM scheme was implemented during the XI plan in 11 DISCOMs of eight states that were highly agriculturally intensive and accounted for more than 70% of electricity consumption in this sector (Maharashtra, Haryana, Punjab, Rajasthan, Gujarat, Andhra Pradesh, Madhya Pradesh and Karnataka). Approximately 20,000 pump sets connected to 87 feeders were assessed in 11 detailed project reports (DPRs) under this scheme and a total of 97 million kWh could be saved. To achieve sustainable energy efficiency in the XII plan, a widespread replication mechanism was used, coupled with subsidies provided by the government to bridge the cost of EEPS pump sets, capacity building for all stakeholders, a few demonstration projects in rural drinking water pumps, and a strategic dissemination strategy. In the Mangalwedha Sub-division of the Solapur District in Maharashtra, the first Agriculture-DSM pilot project has been implemented. The project involves the replacement of 2209 pumpsets with energy-efficient star-rated pumpsets at no cost to farmers, resulting in an annual energy saving of 6.1 million kWh. In Phase one of the Agriculture DSM pilot program in HESCOM, Karnataka, new energy efficient agriculture pumps were installed replacing old inefficient ones in Nippani and Byadgi circles. The 590 pump sets replaced have resulted in energy savings of 37%. EESL has started a bulk procurement programme in this area: where inefficient agricultural pump sets are replaced with BEE 5 star-rated energy efficient pump sets together with smart controls (enabling farmers to remotely monitor and control options to optimize energy and water use) at zero-cost for farmers. The 5-year replacement period also includes free repair and maintenance.

States with a large rural or agricultural consumer base such as

Maharashtra, Rajasthan, Andhra Pradesh, Gujarat and Karnataka have resorted to separating feeders for agricultural use from non-agricultural use. This measure has been adopted to regulate agricultural consumption and manage peak loads. Investment in feeder separation has been encouraged by the Centre through the Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY). Solar pump deployment has also received a push through the Pradhan Mantri Kisan Urja Suraksha evam Utthan Mahabhiyan (PM-KUSUM) scheme. This scheme meant to support installation of off-grid solar pumps in areas with poor grid supply, and reduce the dependence on grid power in grid-connected areas. The scheme will help farmers set up standalone solar pumps, and solarise their grid-connected pumps. Farmers can set up solar power generation capacity on fallow and barren lands and sell the power to DISCOMs. Faster implementation of this scheme requires cooperation among the Centre, States, and other stakeholders (including farmers, manufacturers, and integrators). Lastly, a few states are looking at energy efficiency measures to optimise water use. One such pilot is the previously discussed Paani Bachao Paise Kamao scheme.

Table 1.1: India's water demand of different sectors[4]

Sector	**Standing Subcommittee MoWR**			**NCIWRD**		
Year	2010	2025	2050	2010	2025	2050
Irrigation	688	910	1072	557	611	807
Drinking	56	73	102	43	62	111
Industry	12	23	63	37	67	81
Energy	5	15	130	19	33	70
Other	52	72	80	54	70	111
Total (BCM)	813	1093	1447	710	843	1180

Meeting water demand in agriculture often involves extracting water from natural sources like rivers, lakes, and groundwater aquifers. However, increasing demand for water, coupled with finite water resources and environmental concerns, has necessitated the adoption of strategies to optimize water use, such as improving irrigation efficiency. It is enough evidence that the agriculture pumps segment is the main bottle neck for DISCOMs' viability. Hence immediate programmes are required to improve the

working efficiency of agriculture pumps. One of the immediate actions is to replace the old inefficient / sub-standard pumps with the five star rating most efficient pumps. Over all commercial viability has to be achieved in the programme. The prescribed formats and process is in the DSM regulations. Various AG-DSM programmes arereviewed in details and key data gaps are studied. Deployment plans are also studied in detail to understand the impact assessment of the programmes. Programme Performance, Evaluation, Measurement & Verification are the mandatory actions after implementation of the programme. That gives the impact measurement of the programme. Some SERCs have notified the EM&V Regulations separately. These regulations and its measurement tests are also studied in detail. Following regulations by MERC has been reviewed and studied in detail.

a. Maharashtra Electricity Regulatory Commission (DSM Implementation Framework) Regulations, 2010 on 26 April 2010

b. Maharashtra Electricity Regulatory Commission (Demand Side Management Measures and Programmes' Cost Effectiveness Assessment) Regulations, 2010.

1.5 DSM Regulations

One of the reasons for non-deployment of larger scale DSM programmes is the deficiencies in the existing regulatory and policy framework. These deficiencies include lack of clarity around obligation on distribution utilities to take up DSM measures; absence of clear mandate to the State Electricity Regulatory Commissions (SERCs) to ensure development and implementation of DSM programmes; absence of Regulations/guidelines for design, development and implementation of DSM activities. In the absence of an overall target/goal, DSM programmes are undertaken on piecemeal basis. Also, there is a lack of institutional mechanism for coordination between various stakeholders such as State Designated Agencies (SDAs), distribution utilities, Bureau of Energy Efficiency (BEE) and SERCs to undertake EE&DSM.

It may be noted that after enactment of the EA2003, regulators have proactively pushed the DSM through the institutional framework and to provide the much needed impetus to the Demand Side Management initiatives in the State an enabling regulatory framework is required. In this report through understanding of the Demand Side Management Regulations is done to elaborate upon the administration and delivery mechanism for DSM. Some of the salient features of the Regulations are: Proposed institutional framework 2. Technical Potential Assessment (Utility), 3. Goal & Target Setting (SERC), 4. Load research

(Utility), 5. Market Research (Utility), 6. Economic Potential Assessment (Utility), 7. Preparation and Design of DSM plan (Utility), 8. Approval of DSM plan (SERC), 9. Preparation and Design of DSM projects (Utility), 10. Approval of DSM project funding (SERC), 11. Project implementation (Utility), 12. Monitoring and reporting (Utility), 13. Evaluation measurement and verification (SERC), 14. Dispute Resolution.

1.6 Guidelines and Regulations laid by the SERC Model DSM Regulations

The Regulations provide for DSM Objectives and Targets to be set by the SERC for the Distribution Licensee, to mandate it to undertake DSM activities. To guide the Distribution Licensee to achieve the set targets, provision for guidelines on various aspects of DSM process is provided. Initially the Commission shall issue guidelines on Load and Market Research, Implementation of DSM programmes, Cost Effectiveness Assessment of DSM programmes, Monitoring and Reporting of DSM Plan and Programmes, and Evaluation, Measurement and Verification of savings through DSM programmes. These guidelines may be modified by the SERC from time to time without modifying the Regulations.

The Distribution Licensee is required to constitute a dedicated team of officials with significant authority to undertake the responsibilities envisaged under the Regulations. Hence, constitution of DSM Cell within Distribution Licensee is deemed necessary. The Draft Regulations provide for various activities including load research and development of baseline data, formulation of DSM Plan, Commission review and approval of DSM plan, preparation of DSM Programme Document, approval of DSM Programme Document and implementation of DSM programmes. These regulations aim to provide a guiding document to the States while preparing DSM Regulations. Modifications/additions may be required to incorporate State specific conditions/attributes. Legal opinion may be sought to ensure consistency with prevailing Acts and legal framework in the electricity sector.

These Regulations will be used to assess the economic-effectiveness of a programme or plan and under simple assumptions regarding some of the decision variables such as, inter alia, DSM measure/programme costs and impacts (both, energy - kWh and demand - kVA or KW), discount rate, life, escalation rate and avoided cost.

1.7 Demand Side Management Measures and Programmers' Cost Effectiveness Assessment Regulations, 2010

These Regulations will be used to assess the economic-effectiveness of a

programme or plan and under simple assumptions regarding some of the decision variables such as, DSM measure/programme costs and impacts (both, energy - kWh and demand - kVA or KW), discount rate, life, escalation rate and avoided cost. Some tests required to carry out before submission of the programme for final approval of SERC. Following step by step tree of four sequential tests has to be followed,

a) TRC as the main hurdle test: All DSM programmes that show positive number for the Net Present Value (NPV) of the Benefits over the NPV of Costs should be considered for evaluation of RIM test

b) RIM test: DSM Programmes that show positive number when NPV of the Benefits over the Costs for the Ratepayers are considered should be implemented

c) LRIRIM test: DSM Programmes that do not show positive number for RIM test should be implemented if the tariff impact due to the implementation of the DSM Programmes is less than Rs. 0.01/kWh or less than 0.1% of the existing tariff, whichever is higher.

The main hurdle test is Total Resource Cost (TRC)

The main hurdle test shall be carried out by calculating Net Present Value (NPV) of Benefits (B) and Costs ©. NPV for a DSM measure/programme shall be determined as the difference between B and C.

Where, B = NPV of measure/programme benefits discounted over a specified time period.

C = NPV of measure/programme costs discounted over a specified time period

If, the measure/programme benefit in year "t" is say "Bt", and discounting rate is say "r", the time period for discounting is say "n" years,

Then, B can be expressed as:

$$B = \sum_{t=1}^{n} [(Bt)/(1+r)^{t-1}] \quad \text{..... 2.1}$$

Similarly, If, the measure/programme cost in year "t" is say "Ct", and discounting rate is say "r", the time period for discounting is say "n" years, then C can be expressed as:

$$C = \sum_{t=1}^{n} [(Ct)/(1+r)^{t-1}] \quad \text{..... 2.2}$$

(ii) Cost elements for the TRC test shall be determined considering the following.

a) The cost of efficient device/equipment/appliance/ technology or practice, including

the applicable taxes, duties and levies;

b) Installation, trial and commissioning costs associated with efficient device/equipment / appliance/practi ce/technology;

c) Yearly operation and maintenance costs over the life of the measure/programme;

d) Old inefficient equipment removal and safe disposal costs (if the DSM measure/programme involves replacement or retrofitting)

e) Programme administration, monitoring and evaluation costs

f) Programme marketing Cost.

Thus, if savings at point of use in year "t" are ASt expressed in KWh, and if transmission and distribution losses expressed as percentage in the same year are TLt and DLt, respectively, the Avoided purchase of power in year "t" (APPt) by the licensee would be: = ASt/[(1-TLt) x (1- Dlt)]

If, rate of power purchase in year "t", is Rt, then avoided power purchase cost (APPCt) in year "t" would be: = APPt x Rt

Any reduction in "intra-state transmission charges", as a result of reduction in the average coincident peak demand of the licensee shall be considered as a "benefit" under this test. While calculating energy and demand savings as benefits, year-on-year escalation rate of 5% should be considered. Tests should consider a discount rate of 10.5%. Both benefits and costs; shall be calculated over the "Life" of the technology being deployed. Distribution Licensee shall use the "warrantied" life of the retrofit by the technology provider as it is important to ensure that the savings considered are realized over the life-span of the equipment/appliances. Alternately, "life" as may be defined by the DSM Consultation Committee shall be used.

1.8 Review of Existing Irrigation Methods in Agriculture

Approximately 45% of India's net cultivated area is irrigated, out of 140 million hectares. In the current situation, 9 million hectares of cropland are irrigated with micro-irrigation, of which 4 million hectares are irrigated with drip irrigation. A sufficient supply of water is essential for plant growth. It is only through irrigation that our farmers will be able to store and use water appropriately in the future. Furthermore, our farmers would be able to spend less time on the fields and more time learning new skills, developing themselves, and participating in agricultural forums with proper irrigation facilities.

Table 1.2: Agriculture water distribution systems in India [5]

Irrigation method	Lower, %	Mean, %	Upper, %
Automated irrigation	75	90	95
Sub-surface drip	75	90	95
Drip (micro irrigation)	70	85	95
Lateral (linear)	80	85	87
Pivotal (standard)	75	80	90
Sprinkler	60	75	85
Lateral (movable)	60	70	80
Surface	25	40	55

Planning for irrigation requires considering the following factors: Land suitability, Effective rainfall, When to irrigate (this depends on the soil, crop, and climate), How much water the crop requires, How to irrigate, How much water the crop requires, How to irrigate most effectively.

1.9.1 Sprinkler irrigation

Irrigation by sprinklers is similar to irrigation by rain in which water is sprayed through sprinkler heads using a pipe system. Advantage of this system is that fields of any size can be covered efficiently. Depending on the discharge capacity and outlet capacity of sprinklers, this irrigation method can be applied to a variety of soil types. A sprinkler irrigation system such as that shown in figure 1.3 is suitable for most row, field, and tree crops. It allows water to be sprayed either over the crop canopy or under it. The large water drops produced by large sprinklers can damage delicate crops such as lettuce, so it is not recommended to use them for irrigation

Figure 1.3: Sprinkler irrigation technique

1.9.2 Drip irrigation

Water is drip-irrigated either at the soil surface or below it through a small pipe system to the roots of the plants. This method of water conservation and soil nutrient conservation is also called micro-irrigation. The drip irrigation system consists of valves, tubes, pipes, and emitters. A drip irrigation system has the advantage of being able to run both manually and automatically with the help of a controller. Drip irrigation provides frequent, small doses of water and nutrients to grow plants, resulting in higher yields. Directly delivering nutrients and water to the roots, drip irrigation can improve plant health. The slow and even delivery of water to the roots reduces soil erosion and runoff. Water is delivered only to the roots of plants with drip irrigation, which reduces waste.

Figure 1.4: Drip irrigation technique

1.9.3 Surface Irrigation

A surface irrigation system uses gravity-fed, overland water flow to deliver water to crops. It is a very ancient practice. We have been practicing and following surface irrigation for many years. Gravity-based irrigation is a technique that distributes water over soil surfaces. A field is flooded in this type of irrigation (called basin irrigation) or small channels are irrigated (called furrow irrigation). In spite of the fact that this method is very common, it is not an efficient method.

Figure 1.5: Surface irrigation technique

1.9.4 Basin Irrigation

This method is commonly used for crops that stand in water for an extended period of time, flat lands where rice is grown, or terraces on hillsides. The basin irrigation system consists of flat areas surrounded by low bunds. Water is blocked by these bunds from entering the adjacent fields. Basin irrigation is also suitable for growing trees. To some extent, pastures, citrus, bananas, and tobacco can be irrigated using basin irrigation. It cannot be used for crops that cannot tolerate being waterlogged, such as potatoes, carrots, and beetroot. Basin irrigation can be

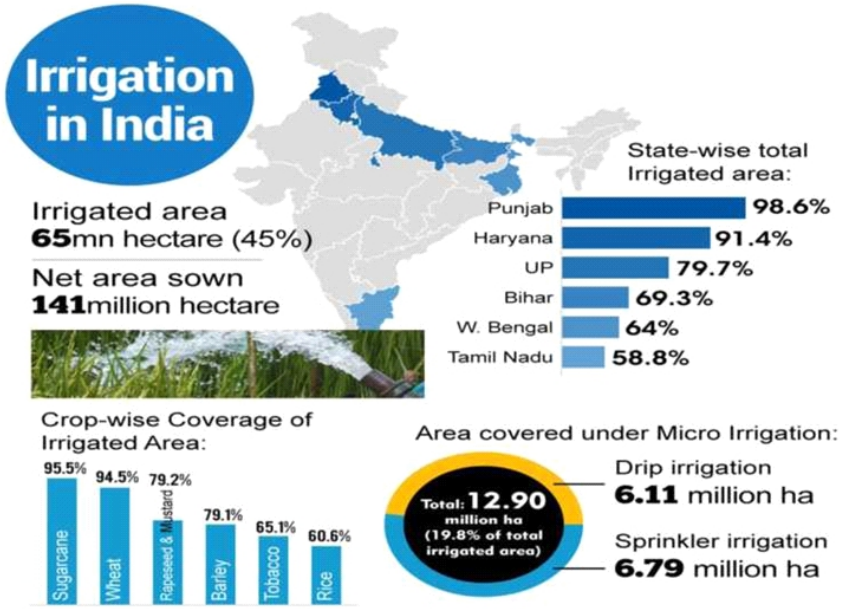
constructed either on a flat surface or on a sloping surface, depending on the type of crop grown. Level basins, called terraces, can be constructed on steps of a staircase.

Figure 1.6: Basin irrigation technique

Figure 1.7: Furrow irrigation technique

In order to properly implement irrigation systems, farmers need to know the type of soil moisture, the quality of irrigation water, and the frequency of irrigation. Figure 1.8 below shows that irrigation status of

Figure 1.8: Irrigation status of India[6]



India, about net area sown about (141 million hectare) 65% of land is under irrigation. Out of total irrigated area 12.9 million hector of land under micro irrigation (6.11mha drip and 6.79mha sprinkler irrigation).

Food and water deeply linked, and together with energy, have ensured continued existence of humans and ecosystems on Earth for millennia.

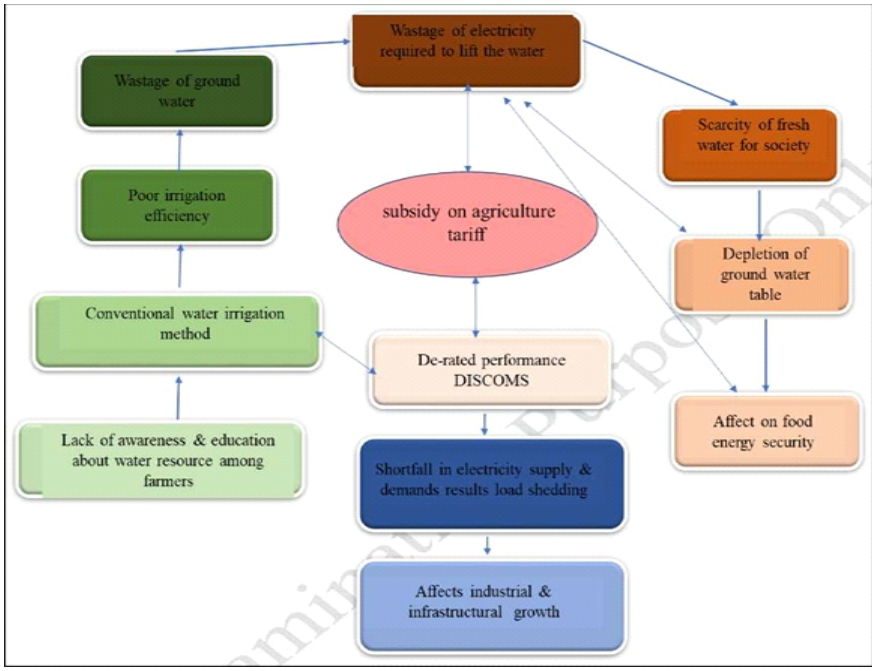
1.10 The nexus concept

An environmental science and policy, the nexus concept refers to the interconnectedness of various environmental resources, such as water, energy, and food. The "water-energy-food nexus," for example, explores the interdependencies and trade-offs between these resources, recognizing that changes in one can have significant impacts on the others. 'No externalities' is the premise behind Nexus thinking. Externalities are costs or benefits that affect a party that did not choose to incur them [7].

The "vicious cycle" of Agriculture - Energy

The "vicious cycle" referring to in the context of agricultural pumps is

Figure1.9: Ground Water and Electrical Energy Vicious cycle in AG-pump



often associated with groundwater depletion and its relationship with energy consumption. Agriculture water pumping sector is stuck in to the vicious cycle of ground water level depletion and unreliable electrical energy to lift the water. Increasing scarcity of energy and decreasing ground water table make call for efficient and judicious use of the available resources. Below Fig. 1.9 shows how the water and energy issue are related and it is a challenge to harmonise these issues for betterment of the Agriculture sector and in turn benefit the society. Literacy rate is very low among the marginal farmers, thus they are less cautious about advanced methods of micro irrigation and energy efficiency in water pumps. A conventional surface flood irrigation method leads to very poor water use efficiency (25 to 40%) and certainly leads to wastages of lifted ground water. In turn Electricity required for lifting the water also leads to wastage. Over-irrigation and wastage of water cause the falling of water table deeper and hence farmers use higher rating water pumps to lift the water; thereby leading to a self-feeding cycle leading to huge wastages which are unsustainable. This may also cause the fear of food security. Depletion of ground water table and increasing demand for agriculture use results in scarcity of water for drinking and industrial purposes. Government is spending a large amount of money towards subsidy (around Rs.40000 Cr in FY 2008) on agriculture water pumps tariff. The financial health and performance of Public DISCOMs is deterioratingand leads to shortfall in availability and supply of electricity. This affects industrialisation and lowers the basic infrastructural growth.

Addressing the interplay between groundwater depletion and energy consumption in agriculture is crucial for achieving sustainable water and energy use in the sector. Collaboration between policymakers, farmers, and relevant stakeholders is essential to implement effective solutions to break the cycle of over-extraction and escalating energy consumption. United Nations University's Food-Energy Nexus Programme introduced the food-water-energy nexus concept in 1983. Technology and policy solutions were emphasized as part of the programme's analysis of food-energy challenges in developing countries [8].

1.11 Review of Policies in Agriculture Water Nexus

Due to its importance in achieving both the SDGs and the Paris Agreement, the WEF Nexus approach has recently received increased attention in international initiatives (e.g., SE for All and the World Economic Forum) as well as support from the research / academic sector, governments, the private sector and

international development partners. Policies in the agriculture-water nexus typically involve assessing how governmental or institutional policies address the complex relationship between agricultural practices and water resources. International development partners and the private sector are increasingly supporting the approach at the project level. Water and energy availability has always been a major concern for food producers (farmers and agro-food companies). They must change gears in order to meet these challenges due to the increased risks of resource scarcity associated with climate change [9].

1.11.1 Policy objectives and scope: Identify the overarching goals and objectives of the policies related to the agriculture-water nexus. These may include ensuring water security, promoting sustainable agriculture, mitigating water pollution, enhancing water use efficiency, etc. ; Also, to determine the geographic and sectoral scope of the policies.

1.11.2Regulatory Framework: Examine the regulatory framework governing agricultural water use. This includes laws, regulations, permits, and standards related to water abstraction, irrigation, drainage, and wastewater discharge. Evaluate the enforcement mechanisms and compliance measures associated with these regulations.

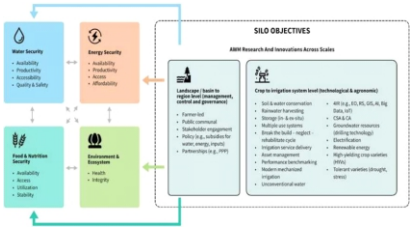
1.11.3Water Allocation and Management: India accounts for about 2.45 per cent of world's surface area, 4 per cent of the world's water resources and about 17 per cent of world's population. The country is subjected to uneven distribution of water, challenged by the negative impacts of climate change. Thus there is a need for proper water management and water conservation. Water allocation and management in India is a critical issue due to the country's large population, rapid urbanization, industrial growth, and agricultural demands. From the earliest times, water resources are allocated among various users, including agriculture, industry, and households. Innovative irrigation technology is generally promoted to raise water-use efficiency along with multiple benefits [10][11].

1.11.4 Sustainable Agriculture Practices: Good agriculture practices as defined by FAO, are a "collection of principles to apply for on- farm production and post-production processes, resulting in safe and healthy food and non-food agricultural products, while taking into account economic, social and environmental sustainability". Various government policies are aimed at promoting sustainable agricultural practices that reduce water consumption and minimize environmental impacts. This may include incentives for adopting

precision agriculture, agro ecological approaches, and soil conservation measures.

1.11.5 Research and Innovation: There is need to formulate policies supporting research, development, and innovation in agricultural water management. This includes funding for water-saving technologies, drought-resistant crops, efficient irrigation systems, and best management practices. Also the need is to assess the integration of scientific knowledge and evidence-based practices into policy formulation and decision-making processes. Water-energy-food (WEF) conceptual framework that integrates siloed approaches for achieving effective agriculture water management (AWM) across multiple scales (Figure1.10) must be put in place.

Figure1.10: Effective agriculture water management (AWM) across multiple scales



1.11.6 Shortcoming of Existing Policies: Existing agriculture policies may have several shortcomings that hinder their effectiveness in addressing the needs of farmers and promoting sustainable agricultural development [13, 14, 15].

1.11.7 Lack of Targeted Support: Agriculture policies often fail to adequately target and support to small-holder farmers, women farmers, and marginalized communities who may face unique challenges in accessing resources, markets, and services.

1.11.8 Input Subsidies Overemphasis: Many agriculture policies focus excessively on input subsidies (such as fertilizers and pesticides) rather than investing in holistic approaches to improving soil health, water management, and sustainable farming practices.

1.11.9 Market Distortions: Subsidies, price controls, and trade restrictions can distort agricultural markets, leading to inefficiencies, disincentives for innovation, and unequal distribution of benefits among farmers.

1.11.10 Limited Extension Services: Inadequate extension services and farmer training programs may hinder the adoption of modern technologies, best practices, and climate-smart farming techniques, limiting productivity gains and resilience to environmental challenges.

1.11.11 Weak Infrastructure Development: Insufficient investment in rural infrastructure, including roads, storage facilities, and market linkages, can constrain farmers' ability to access input and output markets, leading to postharvest losses and reduced profitability[16].

1.11.12 Inadequate Risk Management: Limited access to agricultural insurance, risk mitigation mechanisms, and social safety nets can leave farmers vulnerable to production risks, price volatility, and adverse weather events, undermining their livelihood security and resilience.

1.11.13 Limited Stakeholder Participation: Insufficient consultation and participation of farmers, civil society organizations, and other stakeholders in policy formulation and decision-making processes can lead to top-down approaches that overlook local knowledge, preferences, and priorities.

Following table 1.3 is the set of policies and acts and regulations that are studied and reviewed. While reviewing these, all versions, time to time amendments and upgrades have also been reviewed. Special focus on energy policies with a view of various national /state programmes has been given.

Table 1.3: Different policies referred for this agriculture water nexus study

Policy / Act	Specific Remark
Electricity Act- 2003	Distancing of subsidies , progressive targeted reduction in ratio of (ABR/ ACoS)
Energy Conservation Act-2001	Target DC's in time bound manner . Enforcement of SEC targets.
National Electricity policy-2015	RE Interventions & Demand flexibility ned to be incorporated.
Standardization and labeling by BEE (S&L)	Need to extend the S&L to all gadgets , Prohibition on Std Indution Motors
Jawaharlal Nehru National Solar Mission (JNNSM)	Tragectry on Solar Deployment
Intended Nationally Determined Contributions) working towards climate (INDC)	Further relations with COP-20 and Paris Conventions
National Mission for Enhanced Energy Efficiency (NMEEE)	Sector wise classification – PAT & VGF schemes.
DSM Regulation-2010	Testing methodologies for AG sector
EM & V Regulation -2010	Various protocols for M&V
PM-KUSUM Scheme	Component – B & C
Accelerated Power Development and Reform Program (APDRP)	Smart Meter and Demand response methods
Mukhymantri Saur Krushi Vahini Yojana (MSKVY)	Distributed Solar Vs. Utility scale Solar . Regulatory attention
State policies on open-access net metering	ARR & RE Promotions are not sinked.
KYOYO Protocol, KOP 20 , Paris climate summit	Agreements studied wrt Energy Water
G-20 SDGs	SDGs Reviewed. (Energy Transition Group)

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Panchayati Raj Institutions and Village Secretariats: Challenges of Parallel Governance in Rural Andhra Pradesh

Putta V. V. Satyanarayana

Abstract

This research paper critically examines the role of the Village Secretariat system in Andhra Pradesh as a parallel body in rural local governance, focusing on its relationship with the Panchayati Raj Institutions (PRIs) and its implications for decentralized governance. Established in 2019, the Village Secretariat system was designed to streamline service delivery, enhance administrative efficiency, and ensure the timely implementation of welfare schemes in rural areas. Composed of appointed functional assistants, the system aims to address operational inefficiencies often encountered by Panchayats in executing prestigious government programs.

However, the coexistence of these two systems has raised concerns regarding the erosion of democratic accountability, overlapping jurisdictions, and centralized control, challenging the foundational principles of Panchayati Raj. Hence, this paper explores the tension between the appointed bureaucratic structure of the Village Secretariat and the elected representatives of Panchayats, examining the implications of this dual governance framework for local autonomy and citizen participation.

Through a detailed analysis, the paper identifies the benefits and drawbacks of the Village Secretariat system, highlighting its contribution to enhanced service delivery, transparency, and administrative capacity, as well as the potential risks it poses to the legitimacy and relevance of elected bodies.

The paper concludes by offering recommendations to address these challenges, including clarifying the roles of both institutions, strengthening Panchayats through capacity-building initiatives, integrating democratic oversight, and fostering collaborative

governance. Consequently, this study aims to provide a comprehensive understanding of how Andhra Pradesh's Village Secretariat system interacts with the Panchayati Raj framework and its broader implications for rural governance.

Keywords: Village Secretariat, Panchayati Raj Institutions, Rural Governance, Decentralization, Dual Governance.

Introduction

Rural local governance in India is precisely shaped by the Panchayati Raj system, which was institutionalized through the 73rd Constitutional Amendment Act of 1992. This system is aimed to decentralize governance by empowering elected representatives at the village (Gram Panchayat), intermediate (Mandal Parishad), and district (Zilla Parishad) levels, enabling them to administer local affairs and ensure the delivery of basic services.[1] While this framework has played a crucial role in enhancing democratic participation, the implementation of policies and programs at the grassroots level often faces challenges of coordination, efficiency, and accountability.[2]

In Andhra Pradesh, the establishment of the Village Secretariat system in 2019 represents a pivotal reform aimed at addressing some of these issues. In fact, this system was conceived as a mechanism to streamline service delivery, enhance administrative transparency, and improve the accessibility of public services in rural areas.[3]

This parallel institution, composed of appointed functional assistants at the village level, is designed to implement various central and state government sponsored schemes with greater efficiency and more accountability. Personnel of Village Secretariats are entrusted with the primary duty of ensuring that services such as social security pensions, subsidies, and welfare programs reach the intended beneficiaries in a timely manner.[4] However, the introduction of the Village Secretariat system has sparked a vibrant and multifaceted debate that raised several questions concerning its intricate relationship with the Panchayati Raj Institutions (PRIs).

This debate primarily hinges on whether the Village Secretariat system strengthens local governance by addressing administrative inefficiencies or inadvertently undermines the authority of elected Panchayat representatives. A closer examination of this perception reveals the following critical questions:

Does the Village Secretariat system enhance governance by improving administrative efficiency and filling service delivery gaps?

Do overlapping jurisdictions between the Village Secretariat system

[1]Narayana, E. A. (2007). PANCHAYATI RAJ IN ANDHRA PRADESH: AN APPRISAL OF ITS WORKING SINCE SEVENTY-THIRD CONSTITUTIONAL AMENDMENT. The Indian Journal of Political Science, 68(4), 809–814. http://www.jstor.org/stable/41856378
[2]Standing Committee on Rural Development (2017-2018), Improvement in The Functioning of Panchayats, 50th Report, Ministry of Panchayati Raj, New Delhi. & Secretary, Lok Sabha (2009) Strengthening Parliamentary Democracy; Selected Speeches of Speaker Somanath Chatterjee, Lok Sabha Secretariat, New Delhi p. 691.
[3]"Jagan launches Village Secretariat system in Andhra Pradesh," The Hindu. Andhra Pradesh Edition. 03-10-2019.
[4]G.O. Ms. No. 110, Dated: 19-07-2019. Panchayat Raj & Rural Development (MDL-I) Department. Government of Andhra Pradesh.

and PRIs hinder the smooth functioning of local governance?

To what extent does the presence of the Village Secretariat system affect the political autonomy and decision-making capacity of elected representatives of PRIs?

These questions underscore the complexity of balancing administrative efficiency with democratic accountability and jurisdictional overlaps within rural governance system.

These perplexing questions have baffled scholars and the general public alike, raising noteworthy concerns about the balance of power and the efficacy of rural governance system. These questions are particularly important given the constitutional mandate that positions PRIs as the cornerstone of rural governance.

Therefore, this paper seeks to critically evaluate the interplay between these two pivotal institutions, delving into the structural, functional, and operational dimensions of the Village Secretariat system. Through this examination, the paper intends to offer dynamic insights into the role of Village Secretariat system as parallel body in shaping the Panchayati Raj system in Andhra Pradesh, while illuminating the multifaceted opportunities and challenges arising from the innovation of this institution.

Context of Establishing the Village Secretariat System

The Village Secretariat system, launched in 2019 by the Government of Andhra Pradesh, marks a significant transformative shift in the state's approach to governance and service delivery framework at the grassroots level. This system was conceived as part of a broader strategy to improve the efficiency of rural administration by integrating various public services and ensuring their timely delivery to citizens.[5]

So, the vision behind the Village Secretariat system is to establish a decentralized, citizen-centric governance model that addresses the unique administrative challenges of rural areas while improving the accessibility and transparency of public services. During the launch of the Village Secretariat system at Karapa Village near Kakinada, the then "Chief Minister Jagan Mohan Reddy said he conceived the idea after hearing from the people the problems they faced in villages in getting ration cards, pension and benefits of welfare schemes during his marathon padayatra before the elections."[6]

Accordingly, the Village Secretariat system was designed to act as a bridge between the state government and rural communities, ensuring that welfare schemes and essential services reach the intended

[5]Ibid.
[6]"Village secretariats will usher in Gram Swaraj: JaganMohan Reddy." The New Indian Express. Andhra Pradesh Edition. 03-10-2019.

beneficiaries in an organized, transparent and accountable manner.[7] This innovative approach reflects an attempt in addressing grassroots issues through an efficient administrative mechanism tailored to the needs of rural citizens.

Structure of the Village Secretariat System

Each Village Secretariat is typically composed of a team of 10 to 15 functional assistants, including Village Revenue Officers, Village Surveyors, and representatives from several line departments, such as agriculture, health, education, and social welfare. These Secretariats are established to serve a population of approximately 2,000 residents.[8] The functional assistants are responsible for managing and executing a wide range of government programs, including the delivery of welfare schemes such as social welfare pensions and subsidies, as well as the implementation of health, education, and agricultural initiatives. These personnel are appointed by the state government and report directly to higher authorities in the state administration, ensuring a top-down chain of command.[9]

Thus, the introduction of Village Secretariat system characterized a broader trend in decentralization seen across India, where there has been a gradual shift towards increasing local autonomy and improving governance at the grassroots level. However, while it aligns with the objectives of decentralization, the system introduced a notable departure from traditional models of local governance, particularly in its operational structure. Unlike the Panchayati Raj system, which is grounded in democratic principles and local electoral representation, the Village Secretariat system is composed of appointed functional assistants. These personnel, though crucial in executing government schemes and policies, do not have the same democratic mandate as elected representatives in Panchayats.

This divergence in the composition and authority of the two bodies— the PRIs, with their elected representatives, and the Village Secretariat system, with its appointed functional assistants—raises important questions about governance dynamics in rural areas. While the Village Secretariat is designed to address operational inefficiencies and ensure effective service delivery, its existence alongside the Panchayati Raj system creates a complex interplay between appointed bureaucratic structures and elected democratic institutions. This dual structure has implications for governance, accountability, and the distribution of power at the local level, which this paper will explore further.

[7]G.O. Ms. No. 149, Dated: 30-09-2019. Panchayat Raj & Rural Development (MDL-I) Department. Government of Andhra Pradesh.
[8]G.O. Ms. No. 110, Op. Cit Note. 4.
[9]Ibid.

Key Functions and Contributions of Village Secretariats

Improved Service Delivery

One of the primary functions of the Village Secretariat system is to enhance the efficiency and accessibility of public services at the grassroots level. As a one-stop solution, it has been facilitating the delivery of wide variety of essential services, ranging from issuing vital certificates (such as birth and caste certificates) to resolving local grievances and facilitating the execution of various welfare programs.[10] Highlighting its achievements two years after its establishment, Special Chief Secretary to the Government of Andhra Pradesh, Sri Ajay Jain, stated that the secretariats had provided services to 3.2 crore people across the state. Over this period, the system facilitated the implementation of 543 services and 34 welfare schemes through 15,004 secretariats. Additionally, he announced plans to integrate 150 central government services into the system, further expanding its scope.[11]

Thus, the proximity of the Village Secretariat to rural communities ensured that services are delivered in a timely and localized manner, circumventing the delays often encountered when citizens must travel to district or block-level offices. This localized approach reduced bureaucratic red tape and fostered greater responsiveness to the needs of the rural populace, ensuring that government schemes reach their intended beneficiaries without unnecessary obstacles. Notably, the resolution of over 2.88 lakh petitions in a single day, i.e., on 25th January 2023, and the provision of services to 6.43 crore people within the first three years of its inception stand out as significant milestones in the system's achievements.[12]

Transparency and Accountability

Transparency and accountability are critical issues in public administration,[13] and the Village Secretariat system is designed to address these challenges effectively. The physical presence of the Village Secretariat in rural areas enhances transparency by ensuring that government actions are visible and directly accessible to local communities. This visibility promotes a sense of trust between citizens and the government, as the Secretariat acts as a direct point of contact for the implementation of government programs.

Additionally, the Village Secretariat operates through digital platforms that enable real-time monitoring and data tracking of activities, further reinforcing accountability. The use of technology to track the progress of welfare schemes ensures that any discrepancies

[10]G.O. Ms. No. 149, Op. Cit Note. 7
[11]"AP Secretariat system sets a new record in providing services to people, says special CS Ajay Jain," The Hans India, Andhra Pradesh Edition. 5th October 2021
[12]"AP Village/Ward Secretariat System Sets A New Record In Providing Services," Sakshi, Andhra Pradesh Edition. 29th January 2023.
[13]Jha, Vikas. (2016). Decoding Rural Governance in India. Journal of Management & Public Policy, 8(1), 5-10. Retrieved from https://www.smsfoundation.org/wp-content/uploads/2020/10/Decoding-Rural-Governance.pdf

or delays in service delivery can be quickly identified and rectified, thereby enhancing the overall accountability of local administration.[14]

Bridging Administrative Gaps

The Village Secretariat plays a vital role in addressing the administrative gaps that often exist within PRIs, particularly in terms of technical expertise and logistical support. While Panchayats are the primary bodies responsible for local governance, they sometimes lack the administrative capacity or specialized knowledge to effectively implement complex government schemes.[15] The Village Secretariat fills this gap by providing the technical and administrative resources necessary to execute various welfare programs, such as the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) and the social security pensions. These schemes require a certain level of expertise in planning, monitoring, and resource allocation, areas where the appointed personnel in the Village Secretariat system can provide valuable support. By supplementing the efforts of Panchayats with technical know-how and logistical capabilities, the Village Secretariat ensures that these welfare programs are effectively implemented, maximizing their reach and impact.[16]

Through these functions, the Village Secretariat system contributes to improving the efficiency, transparency, and inclusivity of rural governance, addressing long-standing challenges related to service delivery, administrative capacity, and accountability in rural areas. However, as this paper will examine further, these contributions must be considered in the context of the evolving relationship between the Village Secretariat and Panchayati Raj Institutions, particularly with regard to the balance of authority and decision-making power.

Challenges and Concerns of Village Secretariats

Despite the notable advantages of the Village Secretariat system, it has faced significant criticism and raised concerns, particularly regarding its potential to disrupt the functioning of the PRIs and undermine the principles of decentralized democratic governance. The key challenges include:

Erosion of Democratic Accountability

One of the primary criticisms of the Village Secretariat system is its appointed nature, which stands in contrast to the democratic ethos of the Panchayati Raj framework. Panchayats are elected bodies, accountable to the people through regular elections, which provides them with a legitimate mandate to represent local communities. In contrast, the

[14]G.O. Ms. No. 156, Dated: 21-12-2019. General Administration (Cabinet-II) Department. Government of Andhra Pradesh
[15]Jha, Vikas. (2016). Opcit., Note. 13.
[16]G.O. Ms. No. 150, Dated: 30-09-2019. Panchayat Raj & Rural Development (MDL-I) Department. Government of Andhra Pradesh.

personnel of the Village Secretariat are appointed by the state government, and their accountability lies with the higher authorities in the state administration rather than with the local population.

This creates a tension between the elected representatives of Panchayats and the appointed officials of the Village Secretariat, particularly when their mandates conflict or when there is a perceived duplication of responsibilities. In such cases, the Village Secretariat, despite being a government initiative, may appear less responsive to the democratic aspirations of the rural populace, eroding public trust in both systems.

The Comptroller and Auditor General of India (CAAG) also observed that the main objective of the local self-government is self-governance by including the elected representatives and the citizens in the local administration and taking governance closer to citizens. But the institution of Ward Committee was made irrelevant, and the purpose was defeated with the introduction of Ward Secretariats. Thus, formation of Ward Secretariat at ward level diluted the constitutional provisions and purpose of Ward Committee as envisaged in the Constitution as a bridge between citizens and governance.[17]

Overlapping Jurisdictions

The coexistence of the Village Secretariat and Gram Panchayats often leads to overlapping jurisdictions and responsibilities. While Panchayats are tasked with planning and executing local development initiatives, the Village Secretariat also undertakes the delivery of government services and welfare schemes.[18] This overlap results in duplication of efforts, inefficiencies, and at times contradictory actions, as both institutions may pursue similar goals without clear coordination.

This lack of clarity in roles can create confusion among citizens, who may be uncertain about which authority to approach for grievance redressal or for accessing government services. Such jurisdictional ambiguity undermines the effectiveness of governance and may lead to frustration among the rural population.

Centralized Control

A significant concern surrounding the Village Secretariat system is the centralized control exerted by the state government. While the PRIs are constitutionally mandated to function as autonomous local bodies, the direct supervision of Village Secretariats by state-level authorities undermines this autonomy. Personnel within the Village Secretariats report directly to state-level authorities, and key decisions are often centralized, effectively bypassing the democratic structures established at the local level.[19]

[17]Comptroller and Auditor General of India. (Report No. 2 of 2023). Performance Audit of Efficacy of Implementation of 74th Constitutional Amendment Act. Government of Andhra Pradesh. pp.24&25. Retrieved from https://cag.gov.in/en/audit-report/details/119365
[18]G.O. Ms. No. 110, Op. Cit Note. 4.
[19]Ibid.

This centralized approach contradicts the spirit of the 73rd Constitutional Amendment, which emphasizes decentralized governance by empowering local bodies to make decisions responsive to their community's needs. The erosion of local governance autonomy restricts the capacity of PRIs to function effectively and limits their ability to implement community-sensitive decisions. Consequently, this undermines the very essence of decentralization and weakens the democratic fabric at the grassroots level.

This issue was highlighted in a landmark judgment by the High Court of Andhra Pradesh in the case filed by Turimella Krishna Mohan, the Sarpanch of Tokalavanipalem in Guntur district. The Court observed that the establishment of Village Secretariats by the state government created parallel power centers, diminishing the authority of the Sarpanch and Panchayat Secretary. Referring to Government Order (G.O.) No. 2, dated March 25, 2021, the Court noted that depriving local bodies of control over the Functional Assistants of the Village Secretariat severely impacts the implementation of programs and schemes at the Gram Panchayat level. The Court further stated that this practice directly contravenes the objectives of the 73rd Amendment to the Constitution of India, thereby undermining the foundational principles of decentralized governance.[20]

These concerns highlight the complexities and potential drawbacks of the Village Secretariat system. While the system offers various benefits in terms of service delivery, its implementation alongside the Panchayati Raj Institutions creates challenges related to governance efficiency, democratic accountability, and resource management. Addressing these challenges requires careful consideration of the roles and responsibilities of both institutions and a re-evaluation of the balance between centralized control and local autonomy.

Implications for Rural Governance

From the above discussion it can be inferred that the coexistence of PRIs and the Village Secretariat system in Andhra Pradesh has significant implications for the structure and functioning of rural governance. While the Village Secretariat contributes positively to certain aspects of service delivery, it also raises concerns about the balance of power between elected representatives and appointed personnel, as well as the overall impact on citizen participation in governance. The key implications include:

Reinforcement of Administrative Capacity

One of the positive outcomes of the Village Secretariat system is the enhancement of administrative capacity at the local level. The Village

[20]Turimella Krishna Mohan vs State of Andhra Pradesh, WP No. 10503 of 2021, Andhra Pradesh High Court - Amravati, July 12, 2021.

Secretariat system's functional assistants, such as health workers, and agriculture experts, bring technical expertise and professional support that complement the more generalist functions of PRIs. This specialized knowledge enables the effective execution of complex welfare schemes like MGNREGS, social security programs, health and agricultural initiatives.

In remote and underserved areas where Panchayats may lack the necessary resources or technical skills to manage these programs, the Village Secretariat plays a crucial role in bridging the administrative gaps. Its streamlined processes and efficient service delivery mechanisms contribute to improving the reach and impact of state and central welfare programs, ensuring that rural citizens have greater access to essential services.

Diminished Role of Elected Representatives

While the Village Secretariat strengthens the administrative infrastructure in rural areas, it has the unintended consequence of diminishing the role of elected representatives in local governance. The Gram Panchayats, which are responsible for planning, implementing, and monitoring local development programs, may find their authority eroded as appointed personnel take over the management of government schemes and services. The Sarpanches, who are the elected heads of Gram Panchayats, may find themselves sidelined in decision-making processes, particularly in areas related to welfare delivery. The dominance of appointed personnel in executing village-level programs can reduce the influence of elected representatives, as their role becomes more symbolic rather than substantive. This shift undermines the democratic principles of local self-governance, as it centralizes authority in appointed personnel, potentially leading to a gap between the citizens and their elected leaders.

Reflecting these concerns, at a press conference of the Andhra Pradesh Panchayat Raj Chamber held on 20th March 2024 in Visakhapatnam, district president Ch. Mutyala Rao stated that "there were 12,918 villages in the State. The village secretariat system, established by the YSRCP government in 2021, was a contravention of the Panchayat Raj system. He demanded the revival of powers to Sarpanches under 73 and 74 amendments of the Constitution."[21]

Citizen Engagement

The Village Secretariat system, by providing more accessible and localized government services, has the potential to increase citizen access to welfare programs and administrative

[21]"Sarpanches Association resolves to work for the defeat of YSRCP in ensuing elections," The Hindu, Andhra Pradesh Edition. 21st March 2024.

support. However, this convenience comes at a cost. As citizens engage more directly with the Village Secretariat for service delivery, the emphasis on interacting with elected representatives, such as the Gram Panchayat and Sarpanch, may decrease. This shift may weaken the participatory nature of local governance, which relies on the active involvement of citizens in decision-making processes through their elected representatives. If the Village Secretariat becomes the primary point of contact for rural citizens, it could lead to a diminished sense of ownership and responsibility in local governance, as citizens may bypass their elected leaders in favour of more efficient, bureaucratically managed channels. Over time, this could erode the legitimacy of PRIs, which are intended to provide a platform for democratic participation and local self-rule.

These implications underscore the complex relationship between the Village Secretariat system and the PRIs in Andhra Pradesh. While the Village Secretariat strengthens administrative capacity and service delivery, it also challenges the foundational principles of local democratic governance. The diminished role of elected representatives and the shifting nature of citizen engagement require careful consideration in order to maintain the integrity of the Panchayati Raj system and ensure that it remains a vibrant and participatory element of rural governance. Balancing the efficiency of the Village Secretariat with the democratic accountability of Panchayats is crucial for ensuring that rural governance remains responsive, inclusive, and aligned with the broader goals of decentralization and local empowerment.

Recommendations

Clarifying Roles and Responsibilities

A key step in ensuring the effective functioning of both the Village Secretariat system and PRIs is to clearly delineate their respective roles and responsibilities. This can be achieved through legislative amendments and administrative guidelines that explicitly define the areas of jurisdiction for each institution. Such clarity would prevent overlapping functions and potential conflicts between elected Panchayat representatives and appointed Village Secretariat personnel. By formalizing the division of labour, both systems can operate without encroaching on each other's mandates, leading to more streamlined governance and enhanced accountability.

Capacity Building for Panchayats

To ensure that PRIs are able to coexist effectively with the Village Secretariat system, there is a need to

[21]Government of Mizoram. (2022). Notification No.B.13017/114/2021-UD&PA-Loose Urban Development & Poverty Alleviation Department. Dated June 22, 2022.

strengthen their administrative and technical capacities. This can be done through comprehensive training programs for Panchayat members and staff, focusing on governance, management of welfare schemes, and technical aspects of program implementation. Financial support should also be provided to enable Panchayats to effectively plan, monitor, and evaluate local development initiatives. Furthermore, technical assistance, in the form of expert advice and capacity-building workshops, can equip Panchayats with the necessary skills to handle complex tasks, thus reducing the dependency on appointed officials and ensuring that elected representatives remain integral to local governance.

Integrating Democratic Oversight

To preserve the democratic essence of rural governance, it is crucial to introduce mechanisms that ensure the Village Secretariat operates under the oversight of Panchayati Raj Institutions. These mechanisms could include regular reporting by Village Secretariat staff to the Gram Panchayat, joint monitoring of welfare programs, and the inclusion of elected representatives in decision-making processes related to program implementation. By integrating democratic oversight into the functioning of the Village Secretariat, it will help maintain accountability to the local population and ensure that the elected body retains influence over rural governance. This integration would preserve the role of Panchayats as the primary forums for local governance while benefiting from the efficiency and expertise provided by the Village Secretariat. CAAG also recommend that Government should form Ward Committees and integrate Ward Secretariats with Ward Committees and Area Sabhas to realise self-governance.[22]

Participatory Planning

Encouraging collaboration between Village Secretariat staff and Panchayat members in the planning and implementation of development programs is vital for fostering synergy between the two institutions. Joint planning sessions can help ensure that both the administrative expertise of the Village Secretariat and the local knowledge of Panchayat representatives are incorporated into the design and execution of rural development initiatives. This participatory approach can reduce friction and competition between the Village Secretariat and Panchayats, leading to more coordinated efforts in service delivery and program implementation. By involving Panchayats in decision-making processes, local communities can have a more direct role in shaping the governance framework, thus

[22]Comptroller and Auditor General of India. (Report No. 2 of 2023). Op. Cit Note. 17.

strengthening democratic participation and improving the overall effectiveness of rural governance.

Conclusion

The Village Secretariat system in Andhra Pradesh represents a significant innovation in rural governance, designed to address the challenges of service delivery and administrative efficiency. While it has undeniably improved access to government services and the execution of welfare programs, its parallel nature to the Panchayati Raj system raises concerns regarding the autonomy, relevance, and effectiveness of elected local governments. To ensure that the two systems complement each other rather than create competition or confusion, it is imperative to address issues such as overlap in jurisdiction, accountability mechanisms, and resource allocation.

By implementing the recommendations outlined above—clarifying roles, strengthening Panchayats, integrating democratic oversight, and fostering participatory planning—Andhra Pradesh can create a model of rural governance that balances administrative efficiency with democratic participation. This balanced approach would not only enhance the effectiveness of both the Village Secretariat and PRIs but also provide a robust framework for local governance that can serve as a reference for other states striving for similar governance reforms. Ultimately, the goal is to create a system where citizens benefit from improved services and effective governance while maintaining the democratic foundations of local self-rule.

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An Analysis of Household Expenditure on Child Development in Dharwad District: Patterns, Priorities, and Implications

Arunkumar R Kulkarni

Abstract

Child development is a critical concern that requires substantial financial investment from various stakeholders, including households, corporations, and non-governmental organizations (NGOs). This paper examines the diverse expenditures dedicated to child development, emphasizing significant contributions beyond governmental efforts. Households bear a substantial share of these costs, underscoring their essential role in ensuring children's well-being and development. Using data from 481 sample households, this study analyses expenditure on children across socio-economic groups in both rural and urban areas of Dharwad District. Findings indicate that, on average, households spend Rs. 43,398 annually on child development, which represents 43.1 per cent of their total annual income. Specifically, households spend Rs. 34,224 on education, Rs. 4,028 on health, Rs. 3,579 on nutrition, Rs. 6,415 on clothing, Rs. 910 on footwear, and Rs. 416 on travel for children. Education emerges as the primary area of child development spending, with health and nutrition needs also receiving attention. The study highlights disparities in spending patterns between higher- and lower-income households and examines the implications for child development, especially among disadvantaged socio-economic groups and rural families. The findings suggest that lower-income households dedicate a larger proportion of their income to child development, underscoring their strong financial commitment. It is recommended to increase public spending on education, health, and nutrition to enhance access to public facilities and to reduce the burden on poor and middle-class households.

Key Words: Household Expenditure, Child Development, Health, Education, JEL Classification Codes: D12, D13, J13, I10, I20, I21, I24

1. Introduction

Children constitute a significant portion of the total population and are seen as future assets for national development and hopes for their parents. Therefore, every family and nation should prioritize the development of children. Child development is a multidimensional concept encompassing physical, intellectual, social, and emotional growth (IGNOU, n.a). Investment in child development, including education, health, nutrition, and recreational activities, is critical for the overall development of children and serves as an indicator of household priorities. During the early years, children undergo rapid physical, cognitive, social, and emotional growth, which significantly affects their future well-being and opportunities. This crucial period is greatly influenced by their environment. Child development is a priority, highlighted by scientific evidence that emphasizes its importance for brain development and overall health. Investing in child development offers economic benefits by enhancing human capital, promoting inclusivity, and enabling early interventions to address long-term issues. As a result, the development of children is globally acknowledged as essential, based on scientific research, economic advantages, equity, and alignment with international development goals (Peter, n.d). India, home to the largest child population in the world, has made significant efforts to promote the development and welfare of children. The Constitution of India guarantees Fundamental Rights to all children and empowers the State to enact special provisions for their welfare and protection. Reaffirming this commitment, the National Policy for Children 2013 underscores the Government's dedication to ensuring the realization of every child's rights. The policy recognizes that every child is entitled to essential rights such as survival, health, nutrition, education, development, protection, and participation. These areas have been highlighted as critical priorities for action and intervention. Recognizing that children's needs are multi-sectoral and interconnected, the policy emphasizes the importance of collective action, involving not only the Government and its agencies but also active participation from households to holistically address and fulfil these needs (Government of India, 2013).

Households play a fundamental role in child development, serving as the primary environment where children grow, learn, and form the basis of their future personalities and behaviors (Bradley & Corwyn, 2002). Therefore, households are required to incur various costs on child development for fostering a child's physical, emotional, social, and intellectual growth, laying the foundation for their lifelong well-being

and success. However, many households especially poor and middle-class households struggle to incur expenditure on child development due to limited resources. Thus, they have to make trade-off between child development expenditures, especially on health & nutrition and investment on education (UNICEF, 2017). The poor economic condition of the households many times leads to neglect of health and education of the children.

Studies indicated that there was a correlation between higher household income and increased spending on child development activities such as education, healthcare, and extracurricular activities (Becker, 1991; Haveman & Wolfe, 1995). This expenditure is often viewed as an investment in the child's future earning potential and overall well-being, suggesting that financial resources significantly influence the quality and quantity of investments made on children. Likewise, the studies by Conger & Donnellan (2007) and Bradley & Corwyn (2002) indicated families with higher socioeconomic status were more likely to spend on educational resources, cultural experiences, and healthcare. Patil et al. (2009) examined factors determining household expenditure on child healthcare, finding that socioeconomic status was a key determinant. Households from higher socioeconomic classes spent more on child illness per episode compared to lower classes, who often faced catastrophic health expenditures. The study highlights the need for policies that ensure better access to healthcare services and financial protection for families. Omori (2010) identified household income and parental education as primary factors influencing spending on children's education, entertainment, and books. Hao and Yeung (2015) found that (1) parental education, occupation, and family income significantly impact spending on children, with education being the most influential factor; (2) race remains a significant predictor of parental spending after accounting for socioeconomic status; and (3) parental expectations play a crucial role in determining spending priorities for child development.

Study by Omori (2010) and others shows that household income and parental education significantly impact expenditures on children's education, entertainment, and books. Hao and Yeung (2015) found that parental education, occupation, and family income differentially affect spending, with education being the most influential determinant. Additionally, race and parental expectations play crucial roles in how parents prioritize different spending categories. Dubow, Boxer, & Huesmann (2009) found that parents with higher educational attainment prioritize and invest more in

their children's education and health, providing a stimulating home environment that supports cognitive and social development. This indicates that parental education is a critical factor in enhancing children's developmental outcomes. Mukherjee and Sengupta (2021) explored the factors influencing household spending on education, using data from NSSO 71st round study conducted in the year 2014. The study found a positive correlation between household education expenditure and factors such as household consumer spending, the age of the respondent, the medium of instruction, the availability of private tutoring, and household ownership of a computer. Conversely, larger household size, rural location, being female, belonging to various social groups, affiliation with minority religions, and attendance at certain types of schools were negatively associated with private education spending. Handa (1996) found that female decision making in the household increases the spending on children. Kousar et al (2026) also found that female household heads are more inclined to allocate spending toward education. Additionally, a larger household size and a higher number of children negatively impact household spending on both education and nutrition. In contrast, factors such as the number of employed household members, higher income levels, and greater educational attainment are positively correlated with increased spending on education and nutrition in both male- and female-headed households.

There is also evidence suggesting gender-based differences in household spending on children, which can vary based on cultural and societal norms. Lundberg, Pollak, & Wales (1997) indicate differential spending on boys and girls in areas such as education and health. These differences can have long-term implications for gender equity in access to resources and opportunities. The cultural values and norms may also significantly shape household spending patterns on child development. Harkness & Super (1992) observed strong emphasis on formal education and extracurricular activities in some cultures. Conversely, in other cultures, traditional practices and community involvement may be more prioritized, reflecting the diversity in child-rearing practices globally.

Dervishaliaj (2013) noted considerable gaps in the literature regarding the stress faced by families with disabled children, particularly in methodological rigor, sample representation, and specific variable exploration. Shahat and Greco (2021) highlight the significant economic burden of childhood disability on families, health systems, and societies. The costs vary widely due to differences in perspective, costs included, methods, and disability types. This burden is

especially heavy in developing countries, where out-of-pocket expenses can impoverish families. Efforts should focus on preventing childhood disabilities and supporting affected children and families to enhance their independence and productivity. Public policies and social safety nets significantly influence household expenditures on child development. Subsidies for education, healthcare, and child care can alleviate the financial burden on families, particularly those with lower incomes, ensuring more equitable access to essential services (Heckman, 2006). Effective policy interventions are vital for supporting the developmental needs of all children, regardless of their socioeconomic background.

Tilak (2002) highlighted the significant financial commitment made by households across socio-economic groups. Based on data from the NCAER's Human Development in Rural India (HDI) survey, the study explored the magnitude of household spending on education and the factors influencing these expenditures, including income elasticity and government spending. The findings indicated that households incurred substantial costs for education-related necessities, such as books, uniforms, and various fees, even in government schools where education was intended to be free. This financial burden extended to lower socio-economic groups, including Scheduled Castes and Tribes, who invested in elementary education despite limited resources. The study observed that household spending on education was positively correlated with household income, the educational attainment of the household head, as well as household size, caste, and religion. School-related incentives, such as mid-day meals and free uniforms, also played a role in shaping household decisions regarding education spending. Additionally, the study found a complementary relationship between government and household expenditures on education; rather than one substituting the other, both contributed jointly to educational investment. This suggested that reductions in government spending could lead to a decrease in household investment, exacerbating underfunding in education. Conversely, increased government spending could have potentially mobilized greater household financial involvement, thereby strengthening overall investment in education. These findings underscored the importance of sustained public investment in education to support and encourage household contributions, particularly among disadvantaged groups.

The above studies underscore the multifaceted nature of household spending on child development, influenced by economic, social, cultural, and policy factors. Hence, the

previous studies on household expenditure in India have highlighted significant regional variations and socio-economic disparities. The studies indicate that households prioritize spending on education and healthcare, but the allocation can vary based on income levels, cultural values, and access to services. It calls for targeted interventions to address disparities and support the holistic development of all children. In this context, the present paper tries to analyse the patterns and priorities of child-related expenditure and to explore their implications for child development across different categories of households in Dharwad of Karnataka state.

2. Methodology and Profile of Sample Households

The study was conducted in Dharwad district, Karnataka. Karnataka is the sixth largest state by area and the eighth largest by population in India (Census, 2011). Dharwad district, known for its rich culture, education, and industrial and agricultural development, has a favourable climate for healthy living, making it a relevant area to examine household expenditure on child development. The study utilized a cross-sectional research design, with primary data collected from a random sample of 481 households, covering both urban and rural areas, to analyse child development expenditures for the year 2021-22 in Dharwad district. Data analysis involved simple statistical tools, including averages and percentages, to identify patterns and priorities in household spending on child development. Additionally, regression analysis was employed to assess the relationship between household characteristics and child development expenditure. This methodology provides a robust framework for understanding the patterns, priorities, and implications of household expenditure on child development in Dharwad district.

The profile of selected households has been presented to provide a comprehensive snapshot of the social, status, living conditions, family conditions, education levels and bad habits of parents. A thorough understanding of the profiles of selected households is essential for identifying the specific challenges and needs they face in supporting child development. Table 1 provides profile of sample households.

Table 1 reveals that the majority of households belong to OBC (41.0%), followed by SC (18.7%), and ST (8.9%), with Hinduism being the dominant religion. Most households own their homes (76.7%), with semi-pucca houses being the most common type (45.1%). Nearly all households (99.2%) have electricity, 83.4% have their own toilet facilities, and 97.9 per

Table 1: Profile of Sample Households

Households by Social Category (%)		Households by Type of the House (%)	
SC	18.7	Kutcha	27.4
ST	8.9	Pucca	24.9
OBC	41.0	Semi-Pucca	45.1
Religious Minorities	14.3	Hut	2.5
Others	17.0		
Ownership of the Sample Households (%)		**Households having Access to Toilet (%)**	
Own House	76.72	Own	83.4
Rented	22.45	Common	5.6
Others	0.83	No Facility	11.0
Houses Electrified (%)		**Households Receiving food grains under PDS (%)**	
Yes	99.2	Yes	77.3
No	0.8	No	22.7
Households by Type of Ration Card		**Type of Household by Cohabitation of Father and Mother (%)**	
APL	7.9	Cohabiting	92.5
BPL	73.4	Single Father	0.2
Anthoyadaya	4.4	Single Mother	7.1
No Card	14.3	Others	0.2
LPG Connection (%)		**Education Level of Mothers (%)**	
Yes	97.9	Data NA	2.3
No	2.1	Pre-Primary	0.6
Education Level of Fathers (%)		Primary	24
Data NA	5.2	High School	38.7
Pre-Primary	1.2	Diploma/ITI	1.1
Primary	21.8	PUC	17.7
High School	34.3	Degree	7.9
Diploma/ITI	2.7	Post Graduate	3.6
PUC	13.9	Others	6.4
Degree	8.9	**Usage of Television, Computer and Mobile by Children (6 to 18 Years) %**	
Post Graduate	3.5	Television	50.6
Others	8.3	Computer	1.6
		Mobile	59.6
Bad Habits of Fathers (%)			
Alcohol and Smoking	8.1	Smoking, Alcohol and Gambling	2.7
Gutkha and Chewing Pan	8.1	Smoking	1.5
Alcohol Consumption	4.6	Alcohol and Gambling	0.2
Alcohol and Others	3.3	Gambling& Smoking	0.2

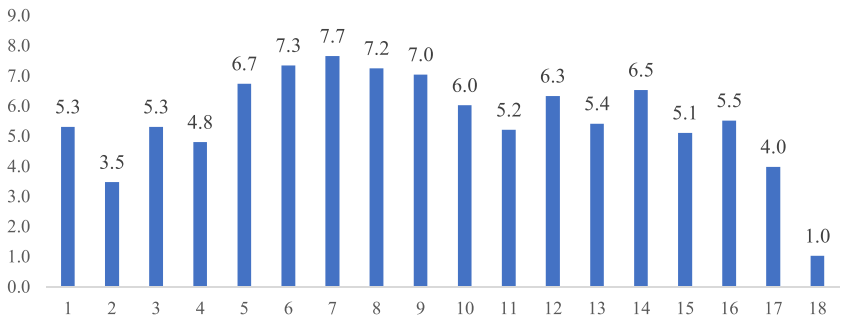
cent use LPG for cooking. Ration card distribution highlights that 73.4 per cent hold Below Poverty Line (BPL) cards, with 77.3 per cent utilizing the Public Distribution System (PDS) for food grains. The majority of households (92.5%) consist of cohabiting parents, and a notable

percentage of both fathers (34.3%) and mothers (38.7%) have completed high school education. However, challenges persist, as 28.7 per cent of fathers have bad habits, with alcohol consumption being the most prevalent. Additionally, 5 fathers have crime records, raising concerns about family stability and security. On the whole, most households are educated and have access to public provisions, while only a small number of households have bad habits, indicating a better environment within the family, although most of them are poor.

Understanding the age distribution of children within households offers a perspective on their developmental stages, needs, and the types of services or support they require. Younger children may need more childcare and early education, while older children might require more in terms of school-related expenses and extracurricular activities. The age profile can also provide information on the dependency ratio in the household and highlight the stages at which children are most vulnerable. Chart 1 provides information on the proportion of children in each age group from 1 to 18 years in the sample households.

Chart 1 shows that the percentage of children generally decreases as age increases, with some fluctuations along the way. The percentage of children is relatively higher in the early years, with 1-year-olds at 5.3 per cent, gradually decreasing to 4.8 per cent at age 4, and then slightly increasing at age 6 to 7.3 per cent. In the age group of 7 to 14 years, the decreasing trend continues until age 11 and then slightly increases to 6.5 per cent at the age of 14. In the adolescence age group (14-18), the proportion of children decreases with age. In conclusion, the data illustrates a consistent pattern of declining percentages as children age, with notable fluctuations at certain points.

Chart 1: Age Distribution of Children in Sample Households (%)



The highest proportions are found in the early years, gradually decreasing through middle childhood, and declining further into adolescence. This observation underscores the natural progression of childhood development and highlights the shifting demographic landscape across age groups.

3. Child Development Expenditures: Patterns and Priorities

Household expenditures on child development, apart from contributions from government, corporate bodies, and NGOs[1], are influenced by various factors, including income levels, education, and the household's urban or rural location. Household expenditures represent private expenditures made to access and utilize services offered by both public and private sector providers. They also highlight distinct patterns and priorities, which vary across different household categories. These expenditures mainly include; education, healthcare, nutrition, clothing, footwear and tour and travel. Understanding these spending patterns provides valuable insights into how households value different aspects of child development and highlights potential areas where support and intervention can make a difference in fostering well-rounded growth for children. Table 2 shows expenditure on child development by sample households.

Table 2: Expenditure on Children Development by Sample Households (Rs/Household)

Expenditure	ST	SC	OBC	Minorities	Others	Total
Education	22007	28197	26965	27387	34224	28050
Health	6133	5077	4137	2978	2394	4028
Nutrition	2721	3569	3238	3114	5248	3579
Clothing	7948	7108	5628	4796	8102	6415
Footwear	912	994	871	920	903	910
Tour and Travel of Children	259	186	614	426	270	416
Total Expenditure on Children	39979	45131	41451	39622	51140	43398
Annual Income of Households	65630	81281	101365	92354	146213	100766
% of Child expenditure to total income	60.9	55.5	40.9	42.9	35.0	43.1

[1]Detailed estimates at the district level are presented in the project report titled Resource Tracking for Child Welfare: Going Beyond Child Budgeting—A District Level Investigation, sponsored by the ICSSR, New Delhi.

Table 2 reveals that, on average, households spent Rs.43,398 on child development, with noticeable variations across different social categories. Education emerges as the largest expenditure category for all groups, with households in the "Others" category spending the highest amount (Rs.34,224), followed by SC (Rs.28,197) and Minority (Rs.27,387) households. On average, households spend Rs.4,028 on health, Rs.3,579 on nutrition, Rs.6,415 on clothing, Rs.910 on footwear, and Rs.416 on tour and travel for children. The average ratio of child-related expenditure to household income is 43.1 per cent. ST households allocate the highest percentage of their income to child development (60.9%), while "Others" households allocate the lowest proportion (35%). This trend suggests that although households with higher incomes, such as those in the "Others" category, have a higher absolute spending on child development, lower-income households, such as ST, allocate a larger share of their limited income towards child-related expenses. This pattern indicates a significant financial commitment to child development, especially among socio-economically disadvantaged groups. Chart 2 shows proportion of various child development expenditures.

Chart 2: Share of Various Child Development Expenditures (%)

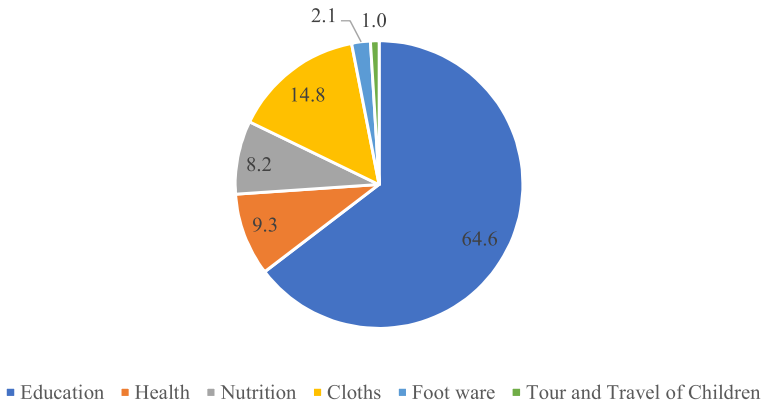


Chart 2 reveals that education is the primary focus, accounting for 64.6 per cent of total spending. This significant allocation underscores the high value that households place on education as a key to children's future opportunities and success. Health and nutrition expenditures, although important, are comparatively lower, at 9.3 per cent and 8.2 per cent, respectively,

suggesting that these areas, while essential, receive less prioritization relative to educational needs. Clothing follows as a moderate priority with 14.8% of expenditure, reflecting its importance for basic needs and social well-being. Footwear and tour and travel for children are the least prioritized, with only 2.1 per cent and 1.0 per cent of the budget allocated, indicating that these items may be considered more discretionary. Overall, the data highlights education as the dominant concern in child development spending, with essential health and nutrition needs receiving secondary focus.

Expenditure on child related issues also varies across the rural and urban areas. Table 3 shows expenditure incurred by sample households in rural and urban areas.

Table 3 reveals that urban households spend significantly more on education for their children (Rs 39,258) compared to rural households (Rs 17,254). Rural households, however, allocate more to nutrition (Rs 4,988) than their urban counterparts (Rs 2,115), suggesting a greater focus on nutritional needs in rural areas. In terms of clothing, rural households also spend more (Rs 8,688) than urban households (Rs 4,055). For health, both urban and rural households have comparable expenditures, with urban households spending Rs 3,908 and rural households Rs 4,143. Urban households allocate more for children's footwear (Rs 1,205) than rural households (Rs 626), as well as for children's tours and travel (Rs 490 compared to Rs 346 in rural areas). The total expenditure on children in urban households (Rs 51,031) is higher than

Table 3: Expenditure on Child Development in Rural and Urban Areas (Rs/Household)

Expenditure	Urban	Rural
Education	39258	17254
Health	3908	4143
Nutrition	2115	4988
Clothing	4055	8688
Footwear	1205	626
Tour and Travel of Children	490	346
Total Expenditure on Children	51031	36045
Income of Households	122048	80265
% of Child expenditure to total income	41.8	44.9

in rural households (Rs 36,045). Despite these differences in spending, the percentage of child expenditure to total household income is slightly higher in rural households (44.9%) compared to urban households (41.8%). This suggests that, while urban households have a higher overall expenditure, rural households dedicate a larger share of their income to child development, highlighting the financial commitment of rural families toward child-related expenses despite lower income levels.

Table 4 shows expenditure on child development by education level of the head of the household (Father).

Table 4 illustrates that households with less-educated heads (e.g., Lower Primary) allocate a higher proportion of their income (64.8%) towards child-related expenses, despite having the lowest income level (Rs.27,333). In contrast, households headed by individuals with higher education levels, such as those with a post-graduation (19%) or Diploma/Technical education (20.8%), allocate a lower percentage of their income to child expenses, though they possess significantly higher incomes. Education-related expenditure is the largest category across all education levels, with the highest absolute spending on education observed in

Table 4: Household Expenditure on Child Development by Education Level of Head of Household (Rs/Household)

Expenditure	Lower Primary	Primary	High School	PUC	Degree	Post Graduation	Diploma/ Technical	Others
Education	6550	18577	28794	34592	43093	40274	44891	19570
Health	0	2698	5168	4794	2395	1353	1538	7765
Nutrition	2333	3043	4376	2834	3965	1647	3923	5658
Clothing	8500	6764	6465	5981	5814	3853	4538	8600
Footwear	333	742	1033	845	1086	1171	1246	861
Tour and Travel of Children	0	295	472	157	850	835	962	294
Total Expenditure on Children	17717	32119	46308	49203	57203	49132	57098	42748
Income of Households	27333	69941	95989	106287	145267	258882	275000	82203
% of Child expenditure to total income	64.8	45.9	48.2	46.3	39.4	19.0	20.8	52.0

households with Diploma/Technical education (Rs.44,891). Health and nutrition expenditures vary, with health spending notably higher among 'Others' (Rs.7,765) and nutrition spending highest in the 'Others' group as well (Rs.5,658). This trend indicates that as the education level of the household head increases, households tend to spend more in absolute terms on child development, but the percentage of total income devoted to these expenses decreases, likely due to higher income levels.

The following paragraphs present details of expenditures on education, health, and nutrition. Table 5 presents household total expenditure on education per child across various types of schools and educational levels. Expenditure on education includes; fees, donation/additional fees, uniforms, text books, note books & manuals, stationery and drawing materials, transport, food expenditures during the school hours, rent for rooms/hostels, private coaching, excursions and trips conducted by education institutions, and other payments.

Table 5 shows that private schools demonstrate significantly higher expenditures compared to other school types, with the most substantial investments observed at the technical and others levels, reaching Rs 49675 and Rs 50433 per child, respectively. Aided schools also exhibit notable expenses, particularly at the PUC level, reflecting specialized education requirements. Government schools generally display lower education costs, though expenditures vary across educational levels, with slightly higher

Table 5: Household Total Expenditure on Education 2021-22 (Rs./Child)

Type of School	Level of Education							Total
	Nursery	Pre Primary	Primary	High School	PUC	Technical	Others	
Private	19538	22335	24830	31453	33384	49675	50433	26585
Aided	.	11575	9883	15358	36725	.	.	15171
Govt	1631	4439	5357	6397	12143	19700	650	5848
Govt. Residential	.	.	15200	.	.	.	.	15200
Others	.	.	34003	1900	.	.	463	1759
Total	12503	18505	14818	16384	27777	39683	5639	16284

Note: Expenditure on education includes; fees, donation/additional fees, uniforms, text books, note books & manuals, stationery and drawing materials, transport, food expenditures during the school hours, rent for rooms/hostels, private coaching, excursions, and trips conducted by education institutions, and other payments.

costs seen at the high school and technical levels. Government residential schools show uniform expenditures at the primary and government residential levels. Other types of schools exhibit considerable expenses primarily at the primary and technical levels. Overall, the data highlights that education expenditure is influenced by factors such as school type, educational level, and additional services provided.

Children in the selected area faced health problems such as colds, coughs, fevers, respiratory issues, stomach issues, and skin problems. On average, 17.5 per cent of children experienced health problems. Among them, 16.6 per cent sought treatment and 5.6 per cent of children were admitted for treatment. In terms of outpatient care, households spent significantly more on private healthcare compared to government services, with an average expenditure of Rs 6709 per child in the private sector compared to Rs 1680 in the government sector. Similarly, for inpatient care, households allocated a substantial portion of their expenditure to private healthcare, with an average spending of Rs 25513 per child, compared to Rs 3714 in the government sector. On average, households spent Rs 6057 for outpatient care and Rs 22579 for inpatient care. Thus, households spent significant proportion of their income in ensuring the health of their children.

For maintaining the good health of their children households spent for nutritional support. On average, 39.9 per cent of households feel their children are underweight, indicating a prevalent issue of malnutrition in the district. Governmental assistance is provided through programs like Anganwadi and mid-day meals. Specifically, 39.6 per cent of children receive nutritional support from Anganwadi, and 59.9 per cent of children have mid-day meals in school. Additionally, 48.4 per cent of households also spend on nutritional support for their children, amounting to Rs. 3853 per year. On average 83.9 per cent of children among the sample households are fully immunised indicating high level of care for the health of the children.

The regression analysis was conducted to understand which factors significantly affect household expenditure on child development. The following are the key findings.

- Income Category: Income levels positively influence spending on child development. Households in higher income categories tend to spend more on their children's development, with a statistically significant impact ($p = 0.034$).
- Education Levels (EL): Different education levels of the children (like pre-primary, primary, high

school, and PUC) have a substantial positive effect on expenditure. This means households tend to spend more as children progress to higher educational levels. Specifically, children in high school and PUC (pre-university) lead to increased household spending, showing that education is prioritized in child development expenditures.

- Area: The area of residence has a slight negative impact on expenditure ($p = 0.027$), indicating that households in rural areas spend less on child development compared to urban areas.

- School Type (Private, Aided, Government): Private schooling tends to increase child development expenditure, though not at a statistically strong level ($p = 0.089$). In contrast, government schooling shows a significant negative effect on spending ($p = 0.013$), which may imply that households with children in government schools have lower overall expenses on child development.

- Other Factors: Factors like the father's education level, social group, and the total number of children in the household had minimal impact on overall spending on child development, as these variables were not statistically significant.

Overall, the model indicates that household income and the child's educational level are key factors in determining child development spending, suggesting that families with higher incomes and children in higher levels of education are likely to invest more in their children's development.

4. Conclusion and Policy Implications

The paper reveals that education is the top priority for child-related spending across all social groups and regions, underscoring its importance for households in Dharwad district. However, the data also indicate significant disparities in spending patterns, with lower-income groups like ST and rural households dedicating a larger proportion of their limited income to child development. This pattern suggests that, despite financial constraints, these households prioritize investments in their children's future, particularly in areas like education, health and, which are essential for foundational development of children. The financial commitment to child development, especially among socio-economically disadvantaged groups, has significant implications for child development outcomes. However, the limited resources available to lower-income households may impact the quality of services accessed, potentially affecting long-term outcomes for children in these groups. The findings

underscore the need for additional targeted interventions to support child development, particularly for low-income and rural households. The existing financial assistance or subsidies related to children need to be enhanced to improve access to quality education, healthcare, and nutrition for disadvantaged families which could reduce some of the financial burdens faced by these households. By addressing the disparities in child-related spending, policymakers can work towards more equitable developmental outcomes, ensuring that all children, regardless of socio-economic background, have the opportunity to prosper in terms of education, health, and nutrition. Hence, it is strongly recommended to increase public spending on education, health, and nutrition to enhance access to public facilities and to reduce the burden on poor and middle-class households.

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- This is a Peer-Reviewed journal.
- Contributions need to be in English.

  The journal is dedicated to governance and developmental issues. Therefore, submissions could be related to governance and development related subjects – urban, rural or tribal, i.e., issues confronting cities, villages, peri-urban areas, issues related to urban and rural local bodies, issues related to education, public health, livelihood, urban and/or rural poverty, gender equality, etc. We however do not wish to limit the scope of authors' contributions to these areas. These are only indicative.
- Normally length could be 3000 to 4000 words though we do not wish to limit the size.
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The Local Government Quarterly has been instituted and is being published with a view to promote the knowledge and sharing of ideas on subjects related to local governance - urban and rural, in India and overseas. It seeks to address related subjects including, but not limited to, education, public health, livelihoods, urban and rural poverty, gender equality.

The publication aims to contribute to the development effort in these and related areas by taking a positive approach so that achievement of favourable outcomes is made possible. The aim is to enable positive impacts in all sections of society including the poor, vulnerable and disadvantaged. The publication aims to add value to the efforts of all stakeholders particularly those working in these and related fields from all sectors - government, non-government organisations, academia, research and industry.

The publication is committed to a fair and equitable approach in all its pursuits and is bound to act without any ideological bias, in a non-adversarial, non-discriminatory and positive manner. The publication is committed to respect diverse views of stakeholders, especially of the contributing authors provided these are not against or unfair to any section/s of society or could create disharmony among or hurt the sentiments of any section/s of society – actually or potentially.

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We commit ourselves to the standard ethical norms.

Publication and Peer-review Policy

Local Government Quarterly is being published by All India Institute of Local Self-Government by incorporating research papers and articles contributed by diverse stakeholders including academicians, urban planners, practitioners and others with, among others, the following objectives:

- To bring to the fore and highlight issues regarding governance and development especially in India. The issues could include urban, rural or tribal ones covering an array of topics including education, public health, poverty, livelihood and gender.
- The aim is to generate debate and deliberation with the objective of seeking solutions to challenges in the above areas.
- To contribute to capacity building of institutions and personnel working in the related fields thereby improving their response to the issues being confronted in these sectors.
- Contributions are invited from authors in accordance with the 'Guidelines for Authors' published separately.
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Report Review

WORLD CITIES REPORT 2024 – CITIES AND CLIMATE ACTION

Read the full report here:

https://unhabitat.org/wcr/

The World Cities Report 2024 has been published by the United Nations Human Settlements Programme (UN-HABITAT). It was released in November 2024 at the World Urban Forum in Cairo. This is among the sought after reports keenly followed by policy makers, urbanists and others. This edition is titled 'Cities and Climate Action', an urgent and pressing subject in the current context.

The Foreword has been penned by the UN Secretary General Antonio Guterres. He starts off by saying, "The fight against climate change and the struggle to achieve more sustainable and equitable urbanization are two sides of the same coin." There is need for bold investments and proper planning and design so that cities are able to slash greenhouse gas emissions and adapt to the effects of climate change. Hundreds of cities in the world are showing the way in this respect. He highlights the role of local and regional governments in this regard and calls for sustainable action on their part.

Thereafter, the report contains an introduction authored by Anaclaudia Rossbach, Under-Secretary-General and Executive Director, UN-Habitat. The author notes that with every passing year, the impacts of climate change worsen while concrete actions to address these lag far behind. Further, the impacts are felt disproportionately by different sections of the urban population with people in informal settlements, women, children, elderly, people with disabilities, etc. being more exposed to risks and also less likely to receive support after the shock occurs. Cities must look to urbanize in ways that are beneficial, not harmful to the planet. At the same time, it is essential to exercise caution while accelerating climate adaptation and mitigation efforts in order to 'avert unintended and exclusionary consequences.' Therefore there is need for a people-centric approach keeping social aspects and inclusion at the centre of climate adaptation and mitigation strategies. Alongside the author points to the fact that there is cause of optimism in the report in that it offers a comprehensive review of what needs to be done at the international, national and local levels.

Then there is a section titled Key Findings and Messages. This gives a quick look into the contents of the

report in a crisp and concise manner, like an Executive Summary. It lists the Key Findings and Key Messages in each of the 10 chapters of the report. Some of them are as follows:

Chapter 1 - Cities as hubs for climate action

Key Findings

- ***Though urbanization continues to be a major source of greenhouse gas emissions, in many contexts urban emissions per capita are now lower than national averages***

  This is true particularly of developed countries driven by lifestyle choices, and policy decisions around housing, transportation, etc. among others.

- ***Rather than regarding them as problems, cities should be seen as key to achieving global climate goals.***

  Compact cities with efficient transportation systems, energy efficient buildings, etc. can be less carbon intensive than suburban or rural areas.

- ***Countries that have a higher share of informal housing and employment are more vulnerable to climate change.***

Key Messages

- ***Climate action, as currently implemented in urban areas, does not reflect the urgency of the threat posed by climate change***

- ***People must be at the centre of any meaningful climate action in cities and human settlements***

  Cities must be inclusive and respond to the needs of the most vulnerable – women, children, disabled, etc.

Chapter 2 - Climate Change and International Development: What Have We Achieved Since the Adoption of the Paris Agreement?

Key Findings

- ***Climate change has emerged as a critical factor shaping international development policy, with widespread implications.***

  The world is not on track to remain within the ceiling of 1.5 degrees Celsius temperature rise.

Key Messages

- ***Far-reaching, large-scale action is urgently required in a climate-changed world: an essential pathway to achieve this is through the development of inclusive, locally-led urban transformation.***

- ***Closing the climate finance gap is a pressing priority.***

Mobilisation of additional finance is urgently required to ensure that climate adaption, and mitigation, and loss and damage are well funded.

Chapter 4 - Climate Action and Vulnerable Urban Groups

Key Findings

- ***Urban informality by its nature is a key driver of vulnerability, with slums and informal settlements among the most exposed to disasters and other impacts***
- ***In many cases, current urban adaptation and mitigation efforts are failing to protect the most vulnerable populations from climate change—and even making their situation worse.***

Key Messages

- ***Municipal governments should support locally-led climate adaptation to address vulnerability, boost resilience and enhance city-wide climate action.***

Locally-led adaptation projects often leverage local knowledge and resources, making them more sustainable.

Chapter 6 - Resilient Infrastructure as an Accelerator of Transformative Climate Action in Cities

This chapter deals with infrastructure in cities and the crucial role that resilient infrastructure can play in urban climate action in achieving the SDGs and other objectives. Much of the infrastructure required to build resilience is yet to be built. In any case the bulk of whatever exists is in the developed world leaving the growing urban population of the developing world vulnerable. Nature-based infrastructure in cities must be leveraged to achieve transformative acceleration of climate action.

Chapter 7 - Multi-level Governance for Inclusive Climate Action

Climate emergency is a complex matter and cannot be effectively addressed by just local governments or indeed by any one level of government by itself. Therefore there is need for stronger and collaborative multi-level government for not only vertical structures that link local to national to international governments, but also horizontally between governments and other stakeholders like civil society groups.

Chapter 8 - Fostering Innovation for Inclusive Climate Action in Cities

Here the report says that there is need to go beyond just 'new' or 'advanced' and even include reconfiguration of existing systems and processes to achieve desired

positive outcomes in the social and environmental spheres. Cities must ensure that these innovations work towards inclusion rather than become exclusionary. Among the key findings, it states 'Integration and coordination across the three domains of innovation—technological, nature-based and social—is necessary to unlock co-benefits and optimize synergies for realizing climate-resilient cities.'

One of the Key Messages is "Public institutions, private sector entities and civil society organizations all have a key role to play in advancing inclusive innovation."

Chapter 9 - Financing Interventions for Climate Change in Cities

Key Findings

- ***Cities are receiving less than 20 per cent of the finance required for effective climate action and are struggling to attract financing, particularly for small-scale local projects***

  One estimate puts the quantum of finance required by cities and urban areas at US$ 4.5 – 5.4 trillion annually until 2030 to fund infrastructure. However the actual receipts are way below.

Key Messages

- ***Borrowing from private sources and tapping into global climate funds is necessary for cities to close the financing gap, but this must be approached strategically***

- ***Cities need to enhance their creditworthiness and risk profiles to attract financing at favorable terms, especially from private sources***

Chapter 10 - Building Climate Resilience in Urban Areas

This final chapter starts on a sober note saying that while the alarm was raised several decades ago, including by UN-Habitat, about the threats posed by climate change, the world is yet to see any meaningful scale of mobilisation and investment in response.

Among the key findings, it states that most of the solutions cities need to respond decisively to climate change are feasible.

Among the key messages, it states, 'Rather than focusing on the specific, immediate symptoms of climate change, cities should embrace a more holistic approach that addresses the root causes of vulnerability.'

In the pages following the Key findings and Key Messages, each of the 10 chapters is dealt with in detail. Several perspectives on the subject are

presented and discussed, and a wealth of data is presented and analysed through charts, graphs, and tabulated data. Many pages in the report come alive with excellent images and rendered graphics as also artists' depiction of urban situations. The World Cities Report 2024 – Cities and Climate Action no doubt offers a sobering wake-up call to humanity to urgently scale up efforts to contain emissions and temperature rise. Yet it also offers hope by showing what needs to be done and how.

V. Vijaykumar

An Invitation

The Local Government Quarterly invites contributions in the form of articles and research papers from its readers and well-wishers.

Contributions may be e-mailed to us in digital form as a Word file.

Articles could normally be between 3000 and 4000 words, though we do not wish to limit the size. As we print in black and white, tables, charts, graphs, images, etc. need to be compatible. We reserve the right to edit for sense, style, space, etc.

Contributors may e-mail their articles to:
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OBJECTIVES

The main emphasis of the Institute's work is to see that the local bodies can contribute more effectively to the development process and provide the citizens with better living conditions by meeting their aspirations in terms of required amenities, infrastructure and better environmental conditions, thus contributing to social and economic development of the society as a whole by better management of the human settlements. While these are the long-term objectives, the immediate ones are:

- To advance knowledge of the principles and practices of Local Government by conducting research and by organising training courses and programmes at various centres in India for officials and elected representatives in the local bodies.
- To strengthen and improve Local Government Institutions by improving their performance through education, orientation and bringing them together for common endeavor by organising specialised conferences, conventions and seminars.
- To make available a platform for members of local bodies and officials for exchange of views and ideas related to urban development and administration.
- To represent the views of local authorities supported by research work to the concerned higher authorities from time to time.
- To publish bibliographies, articles, books and other literature on matters of interest to local bodies.
- To publish journals, bulletins and other literature on different aspects of Local Government and on the working of Local bodies in different states.
- To undertake research studies in public administration, problems of local bodies and also in related topics of urban and environmental factors and arrange for their publication etc.
- To establish and maintain an information-cum-documentation service for local bodies.
- To undertake consultancy assignments in various areas of urban development and problems of local bodies with a view to improve and develop organisational, managerial and operational efficiency.

In view of the above, the Institute has been collaborating with the relevant government departments, Central and State, Universities, Organisations and Research Institutions. The work of the Institute covers several aspects involving a multi-disciplinary teamwork.

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