International Journal of Academic Research & Development (IJAR&D)

From the Desk of Managing Editor

Dear IJAR&D Readers,

Greetings !!!

We are glad to present eighteenth issue of IJAR&D which consists of 11 papers on various aspects namely Skill Development, Sustainable Development Goals, Sustainable Finance, Drug Abuse, Healthcare Facilities, Effect of Disasters, Polycastic Ovary Syndrome, Gender Wage Gap, Transgender Empowerment, WASH and Multidimensional Poverty in Odisha.

The joint paper of Dr. Soundarapandian, Ms. Surendran and Dr. Dash delves into role of Deen Dayal Upadhyaya Grameen Kaushal Yojana in empowering women, marginalised and vulnerable section populace in India. Dr. Bhowmik's paper presents an econometric study on Sustainable Development Goals and Multidimensional poverty in India. The joint paper of Dr. Umesh, Ms. Rohilla and Ms. Rani provides a dynamic bibliometric analysis of ecosystem of sustainable finance research.

The joint paper of Dr. Sangeeta, Mr. Dikshant and Mr. Aditya gives a comprehensive study on prevalence of drug abuse amongst the youth of Jalandhar, Punjab. Ms. Panda's paper provides a conceptual analysis of Quality of Healthcare facilities. The joint paper of Ms. Geethalakshmi and Mr. Nishant assesses disproportionate effects of disasters on vulnerable section in India and its implication in terms of achieving sustainable development goals. Ms. Korrapati's paper positions Polycystic Ovary Syndrome in sustainable development goals. Ms. Brahma's paper outlines econometric study of gender wage gap and gender inequality in India. Mr. Behera's paper outlines barriers in empowering transgender communities in India. Dr. Pandya's paper elaborates on Water, Sanitation and Hygiene as pillars of global health and sustainable development. Mr. Panda's paper presents recent evidence of multidimensional poverty of Odisha.

We thank all the authors for their insightful papers which will certainly enrich our readers. We take this opportunity to thank all our reviewers for their structured efforts. We express our heartfelt thanks to all our journal subscribers and readers for their relentless support which provide our team motivation to bring out journal issue in desirable shape. We commit ourself to bring out high quality issues in future.

Best Wishes from IJAR&D !!!

Thanking You

Pradeep Kumar Panda

Managing Editor

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Role of Deen Dayal Upadhyaya Grameen Kaushalya Yojana (Ddu-Gky) in Empowering the Women and Weaker Sections in India

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Abstract

India is home to one-fifth of the world's youth and one of the fastest-growing economies in the world. The Ministry of Rural Development, Government of India started DDU-GKY on September 25, 2014. It is a training, skill-building, and job-placement Programme for rural youth from poor families. The present study analyses the growth of trained and placed participants benefited out of DDU-GKY particularly the women and the weaker section category (SC/ST/Minorities) from 2014-15 to 2021-22. The study relied on secondary data obtained from the Ministry of Rural Development for the beneficiary category of candidates belonging to women, SC, ST, and minority groups, who were placed during the year 2014-2015 to 2017-2018. At the national and overall percentage levels, the annual growth rate for two different variables was tabulated and compared. The Participants of DDU-GKY under the category of Women /SC /ST / Minorities received more training during the scheme's early stages, particularly from 2014-15 to 2016-17. Training growth slowed over the next three years. It shows negative growth in the current year, 2021-22. The COVID-19 pandemic had a significant impact on project implementation agencies. Because of the pandemic's restrictions, the training had to be adjusted. The study found that the participants who fall into the categories of SC, ST, and minorities benefit less from the training process than the women who take part in it. But when it comes to placement, not every woman who gets training is placed. The requirements of the programme stipulated that woman must constitute one third of the participants. However, the data revealed that the actual number of female participants is higher than stipulated level.

Keywords: DDU-GKY, Skill India, Skill Development, Woman, SC/ST community, Rural youth, India

Introduction

India is home to one-fifth of the world's youth and one of the fastest-growing economies in the world. One billion and three hundred fifty million people, or 50 per cent of the total population, are young adults. The most valuable resource in India is its young population, which also gives the country a distinct demographic advantage. Reports indicate that between 67 per cent and 68 per cent of India's total population is young people, with the majority living in rural areas. Given the preponderance

of rural youth, any youth policy must be centered in the rural sector in order to maximize the potential of rural youth and increase their contribution to the growth of the nation. A key factor in creating opportunities for rural youth to find gainful employment is skill development. It will reduce poverty by boosting employability, productivity, and inclusive growth.

India is in a paradoxical situation where, on the one hand, young people entering the workforce are unable to find positions that are suitable for their qualifications and, on the other hand, industries are complaining about a lack of suitable skilled labour. The employment sector in India faces significant challenges due to its informal worker-dominated structure, high levels of underemployment, skill shortages, and labour markets with rigid labour laws and institutions. The Indian government has recently launched a number of skill development initiatives to address these issues. Deen Dayal Upadhyaya Grameen Kaushal Yojana (DDU-GKY) is one of the initiatives that stands out. The Ministry of Rural Development, Government of India started DDU-GKY on September 25, 2014. It is a training, skill-building, and job-placement programme for rural youth from poor families. The goal of the program is to develop economically independent, globally competitive workers from the rural poor youth. The mission of DDU-GKY is to up skill underemployed rural youth and give them regular employment with wages at or above the minimum wage. The goal of the program is to provide rural youth who are unemployed with marketable skills so they can find employment with regular monthly pay. The complementarities between physical capital and human capital on the one hand, and between technology and human capital on the other, make skill development an important area because it helps to increase productivity at the individual, industry, and national levels. Keeping up with the latest in today's ever-evolving knowledge economy is a top priority for all students. Therefore, it is essential that Indian youth acquire the skills that are required by international manufacturers in order to compete with them on the global market.

General education, which imparts transferable skills, is a primary means of skill formation in India. Additionally, sector-specific programmes for better employability in industry are included in skill formation efforts along with vocational education and training. In order to enable them to work together to create a strong India, the National Policy for Skill Development and Entrepreneurship, 2015; seeks to bridge the gap between the worlds of education and training and the workplace. It gives direction and coherence for how the national skill-development initiatives can be coordinated within the current institutional framework. The policy connected

employability and productivity improvements to skill development. In the National Education Policy 2020, it was emphasized the importance of providing secondary school students with mandatory vocational education or skill development training. Although India has a large number of skill development training programmes and spends a lot of money on them, systematic evaluations of their impact on creating jobs and increasing productivity, as well as whether they reach the targeted population, are limited.

According to the Census of 2011, 68.8 per cent of all people in India, regardless of age group, live in rural areas. Scheduled castes and scheduled tribes make up 16.6 per cent and 8.6 per cent of the total population, respectively. Together, the scheduled castes and scheduled tribes make up about one-fourth of India's total population. 90 per cent of scheduled tribes and 76.6 per cent of scheduled castes, respectively, reside in rural areas. These social groups (SC/ST) are thought to be the underrepresented populations in Indian society's development (Census India, 2011). From this background this study analyses the growth of trained and placed participants benefited out of DDU-GKY particularly the women and the weaker section category.

Literature Review

The young population in India encounters substantial challenges as a result of poverty and a deficiency in human capital. Despite the significant growth in educational achievement in recent times, a considerable number of young individuals in India still encounter challenges in securing suitable employment opportunities. Individuals often accept employment opportunities that have low labor productivity due to their inability to sustain a prolonged period of unemployment (Mitra & Verick, 2013). According to Tripathi and Singh (2017), individuals residing in rural areas are increasingly relocating to urban regions in pursuit of improved employment opportunities and a higher standard of living. This trend persists despite the abundance of both human and non-human resources in rural areas, which highlights the existing discrepancy between the demanded skills in urban areas and the skills possessed by rural residents.

Many industries are currently facing the challenge of a shortage of skilled workers amidst their search for qualified individuals to fill job vacancies. As a consequence of this specific incongruity, the individuals in question find themselves without employment (Sunita, 2014). Students from disparate socioeconomic backgrounds may encounter similar job market conditions with regards to employment opportunities and skill mismatches. According to a study conducted by

Dibeh et al. (2018), young individuals express common concerns related to socioeconomic factors, irrespective of their employment status.

According to a study conducted by the World Bank, it has been observed that certain marginalized groups, specifically the scheduled castes and scheduled tribes, exhibit a lag of 20 years in terms of their performance compared to the average population. However, it is widely acknowledged that the Indian economy has experienced significant growth and made notable strides in poverty reduction in recent years. The social exclusion experienced by marginalized groups in India can be attributed to historical divisions within Indian society based on caste, tribe, and gender (World Bank, 2011).

According to the Planning Commission's report in 2007, it was observed that within the majority of households belonging to scheduled castes and scheduled tribes, the student held the highest level of education within the family. Conversely, in approximately one-third of cases involving students from the general category, the father held the highest level of education within the family.

The economic underdevelopment of scheduled castes and scheduled tribes can be primarily attributed to their predominant engagement in the primary sector of the economy. In contrast to other social groups, the scheduled castes exhibit a significant dependence on wage labor and casual labor. The proportion of individuals who receive regular wages or salaries is below 40%. To provide further clarification, it has been observed that salaried individuals, among various other groups, represent a minority (Bhatnagar and Dwivedi, 2013).

The majority of young people in India come from low-income, underprivileged families and have minimal access to formal education or job training. Consequently, a significant proportion of the younger population in India enters the workforce lacking adequate vocational skills and education, resulting in engagement in informal and unregulated sector jobs, such as casual labor and diverse forms of self-employment, which offer remuneration at a low level (Okada, 2012). In order to enhance their employability, it is imperative for young individuals to cultivate essential life skills, including but not limited to, the ability to effectively manage adversity and stress, as well as engage in critical thinking (Pandey, 2012).

The Deen Dayal Upadhayaya Grameen Kaushal Yojana (DDUGKY) is a program initiated by the Government of India. Its primary objectives are to enhance the income opportunities for impoverished rural families and cater to the vocational aspirations of the rural youth. This scheme has received a substantial investment of over INR 5600 crores. Since 2014, the Skill India campaign has successfully provided training to over 99 lakh candidates. As of April 1, 2020, a total of 5.3 million trained candidates have been successfully employed.

The Deen Dayal Upadhayaya Grameen Kaushal Yojana (DDUGKY) scheme is strategically situated, with a significant majority of survey respondents in Bihar originating from economically disadvantaged households, surpassing 90 per cent. A total of 42 per cent of the individuals in question were promptly employed subsequent to their training, while an additional one-third were unable to secure immediate employment due to the inadequacy of the wages offered, which failed to meet their basic living expenses. According to Chakravorty and Bedi (2019), the employment impact of this program is negligible. However, the training provided through the program facilitates the transition of graduates from agricultural to non-agricultural roles.

Objective of The Study

The specific objectives are:

(i) To analyze the category wise (women/SC/ST/minority) growth of trained participants of DDU-GKY.

(ii) To analyze the category wise (women/SC/ST/minority) growth of placed participants of DDU-GKY.

Methodology

The present study relied on secondary data obtained from the Annual reports of Ministry of Rural Development website. For this study, the total number of participants trained and the total number of participants placed under DDU-GKY from 2015-2016 to 2020-2020 were evaluated for analysis. The data is displayed for the beneficiary category of candidates belonging to women, SC, ST, and minority groups who were placed in the year 2014-2015 and continuing through the year 2017-2018. At the national and overall percentage levels, the annual growth rate for two different variables was tabulated and compared. The findings were organized in chronological order.

Results and Discussion

The program DDU-GKY targets poor rural youth aged 15 to 35. The maximum age for candidates who are women, members of particularly vulnerable tribal groups (PVTGs), people with disabilities (PwDs), transgender, and members of other special groups, such as those who have been rehabilitated from bonded labour, victims of trafficking, manual scavengers, transgender people, HIV-positive people, etc., is 45 years old. The latest data

shows that from 2015-16 to 2022-23 there are totally fifteen lakh ninety thousand and twenty (15,99,020) candidates trained and in those three lakhs seventy-six thousand one hundred and fifty-six (3,76,156) candidates placed under this scheme (Kaushal Bharat).

The selection and reservation of participants for DDU-GKY program will be found through a process called "Participatory Identification of the Poor" (PIP), which is an important part of the NRLM strategy. At the national level, 50 per cent of the funds would be set aside for SCs and STS, with the MORD deciding periodically how much money should go to SCS and how much to STs. Beneficiaries from minority groups would receive an

additional 15 per cent of the funds. Additionally, states should make sure that at least 3 per cent of recipients are people with disabilities. Women should make up one-third of those who are covered. This allocation is merely the bare minimum. However, if there are no eligible beneficiaries from either of the categories and it is confirmed as such by the District Rural Development Agency, targets from SC and ST can be switched out (DRDA). People with disabilities must submit "separate projects" that have separate training centers and unit costs that are not the same as those specified in these guidelines.

Table 1   Category Wise Trained participants of DDU-GKY

SN	Year	Women	Growth	SC	Growth	ST	Growth	Minorities	Growth
1	2014-15	372235	----	304590	----	150454	----	84762	----
2	2015-16	433020	0.163	397426	0.304	189296	0.258	107694	0.270
3	2016-17	529403	0.222	472223	0.188	223013	0.178	145070	0.347
4	2017-18	583979	0.103	514397	0.089	247837	0.111	166310	0.146
5	2018-19	708589	0.213	583922	0.135	291359	0.175	198718	0.194
6	2019-20	781940	0.103	626136	0.072	319354	0.096	215224	0.083
7	2021-22	533448	-0.317	343212	-0.451	193393	-0.394	174674	-0.188

Source: Computed from the annual reports of MoRD, website of https://rural.nic.in/en/publications/annual-report

Table 1 shows the growth of participants trained among the categories of women, SC, ST, and minorities in DDU-GKY from 2014-15 to 2021-22. In 2015-16, SC, minority, and ST participants had the highest growth rates, while women had the lowest (0.1632). In 2016-17, minorities (0.3470) had the highest growth rate of trained participants, followed by women (0.2225), SC (0.1882). ST participants (0.1781) had the least growth. Minority participants trained the most in 2017–18 (0.1464); second, ST (0.1113) and third, women participants (0.1030), while SC is the lowest (0.0893). In 2018-19, women trained the most (0.2133), followed by the minority (0.1948), ST (0.1756), and SC participants the least (0.1351). In 2019–20, women will be the most trained (0.1035), followed by ST (0.0960), minority (0.0830), and SC participants (0.0722). Due to the COVID-19 pandemic, data for 2020–21 is unavailable. All groups have negative growth in the years 2021–22. SC's growth was slowest during this time (-0.4518). ST follows (-0.3944), third is women (-0.3177), and then minorities (-0.1884).

In general, the Participants of DDU-GKY under the category; Women /SC /ST / Minorities receive more

training during the scheme's early stages, particularly from 2014-15 to 2016-17. Training growth slowed over the next three years. It shows negative growth in the current year, 2021-22. The COVID-19 pandemic had a significant impact on project implementation agencies. Because of the pandemic's restrictions, the training had to be adjusted. The details are explained in detail in the figure-1.
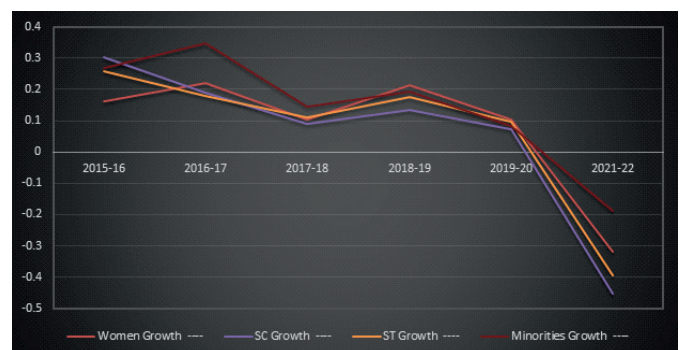
Figure 1   Growth of Trained Participant

**Table 2 Category wise placed participants of
DDU-GKY**

SN	Year	Women	Growth	SC	Growth	ST	Growth	Minorities	Growth
1	2014-15	273247		243214		116515		63795	
2	2015-16	310736	0.137	275646	0.133	133641	0.146	72241	0.132
3	2016-17	379372	0.220	316072	0.146	156065	0.167	86665	0.199
4	2017-18	408966	0.078	342298	0.082	168266	0.0781	95824	0.105

Source: Computed from the annual reports of MoRD, website of https://rural.nic.in/en/publications/annual-report

Table 2 shows the growth of participants trained among the categories of women, SC, ST, and minorities in DDU-GKY from 2014-15 to 2017-18. In the year 2015-16, the ST growth rate was the highest (0.1469) followed by women (0.1371), SC (0.1333) and the growth rate of minorities came at the lowest (0.1323). In 2016-17, the growth rate of placed participants is highest for women (0.2208) followed by minorities (0.1996), ST (0.1677) and least is for SC (0.1466). In 2017-18, the growth rate of placed participants is highest for minorities (0.1056) followed by SC (0.0829), ST (0.0781) and least for women (0.0780).

The placed participants data is available from 2014-15 to 2017-18. While examine the graph it is clear that the growth of placed women participants is higher only in the year 2016-17. Least placement is happened in the year 2017-18. Not every woman who gets training is placed. The details are explained in detail in the figure-2.
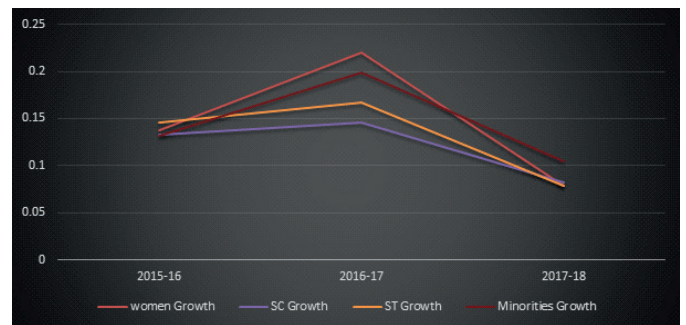
Figure 2   Growth of Placed Participants

Table 3   Category wise Trained participants of DDU-GKY

SN	Year	Women	Women %	SC	SC %	ST	ST %	Minorities	Minorities %
1	2014-15	372235	40.81	304590	33.39	150454	16.49	84762	9.29
2	2015-16	433020	38.40	397426	35.25	189296	16.78	107694	9.55
3	2016-17	529403	38.65	472223	34.47	223013	16.28	145070	10.59
4	2017-18	583979	38.60	514397	34.00	247837	16.38	166310	10.99
5	2018-19	708589	39.75	583922	32.75	291359	16.34	198718	11.14
6	2019-20	781940	40.25	626136	32.23	319354	16.43	215224	11.07
7	2021-22	533448	42.85	343212	27.57	193393	15.53	174674	14.03

Source: Computed from the annual reports of MoRD, website of https://rural.nic.in/en/publications/annual-report

Table 3 depicts the percentage of trained participants of DDU-GKY under the category of women/SC/ST/minorities. In the year 2014–15, among the trained participants, the percentage of men was the highest (40.81%), followed by SC (33.39%), ST (16.49%), and the percentage of minorities was the lowest (9.29%). In the year 2015-16, among the trained participants, the percentage of women was the highest (38.40%), followed by SC (35.25%), ST (16.78%), and least for minorities (9.55%). In the year 2016-17, among the trained participants, the percentage of women was the highest (38.65%), followed by SC (34.47%), ST (16.28%), and least for minorities (10.59%). In the year 2017–18, among the trained participants, the percentage of women was the highest (38.60%), followed by SC (34%), ST (16.38%), and least for minorities (10.99%). The trend is continuing for the years 2018-19, 2019-20 and 2021-22.

The study found that the participants who fall into the categories of SC, ST, and minorities benefit less from the training process than the women who take part in it. The requirements of the programme stipulate that woman must constitute one third of the participants; however, the data demonstrates that the actual number of female participants is higher than what is stipulated. The details are explained in detail in the figure-3.
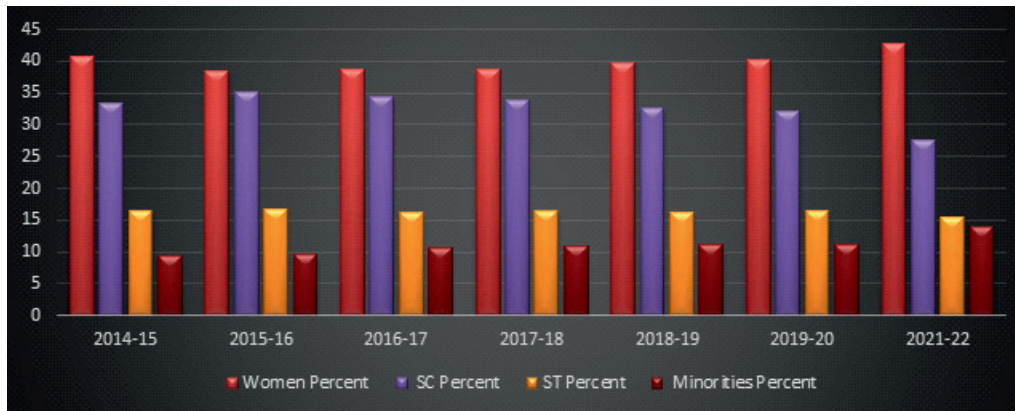
Figure 3   Percentage of trained Participant

Table 4   Category Wise placed participants of DDU-GKY under the category

SN	Year	Women	Women Percent	SC	SC Percent	ST	ST Percent	Minorities	Minorities Percent
1	2014-15	273247	39.21	243214	34.90	116515	16.72	63795	9.15
2	2015-16	310736	39.22	275646	34.79	133641	16.86	72241	9.11
3	2016-17	379372	40.43	316072	33.69	156065	16.63	86665	9.23
4	2017-18	408966	40.27	342298	33.71	168266	16.57	95824	9.43

Source: Computed from the annual reports of MoRD, website of https://rural.nic.in/en/publications/annual-report

Table 4 depicts the percentage of placed participants of DDU-GKY under the category of women/SC/ST/ minorities. In the year 2014–15, among the trained participants, the percentage of women was the highest (39.21%), followed by SC (34.90%), ST (16.72%), and the percentage of minorities was the lowest (9.15%). In the year 2015-16, among the trained participants, the percentage of women was the highest (39.22%), followed by SC (34.79%), ST (16.86%), and least for minorities (9.11%). In the year 2016-17, among the trained participants, the percentage of women was the highest (40.43%), followed by SC (33.69%), ST (16.63%), and least for minorities (9.23%). In the year 2017–18, among the trained participants, the percentage of women was the highest (40.27%), followed by SC (33.71%), ST (16.57%), and least for minorities (9.43%).

The study found that participants who fall into the categories of SC, ST, and minorities derive less benefit from the placement process than women. The requirements of the programme stipulate that one-third of the participants must be female. The data indicate, however, that the actual number of female participants is greater than what is specified. The details are explained in detail in the figure-4.
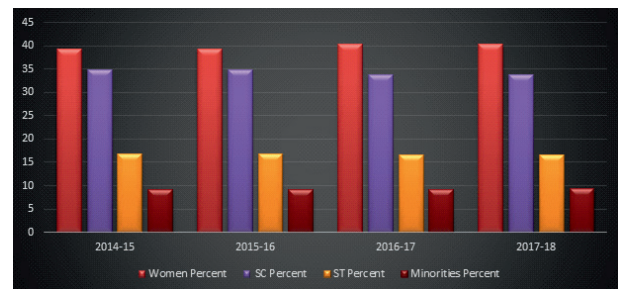
Figure 4   Percentage of Placed Participants

Suggestions

Study finds that unequivocally under the DDU-GKY programme, the participation of communities from disadvantaged sections must be expanded. In the upcoming years, a greater emphasis must be given on the growth of trained participants from weaker section community. The number of placed candidates in the women's category is lower, and many trained women are not being placed. As a result, the government should take additional steps to identify the cause and solution to the problems observed by the trained women under this scheme. The scheme's growth in placed participants is limited; it must be increased in the coming years. Overall, the rate of growth of trained and placed participants in the category of women and the weaker section of the

community is commendable due to the nature of the scheme, which is a rural specific and the growth shows a significant change.

Conclusion

Government of India may undertake efforts to disseminate information regarding placement and training initiatives specifically tailored for scheduled castes and scheduled tribes. By doing so, these communities can be made aware of such programs, thereby fostering heightened engagement and participation. Employment opportunities should be allocated based on an individual's aptitudes and competencies, rather than being influenced by any other unjustifiable factors. The Government of India should establish a systematic monitoring mechanism to assess the progress of these schemes on a regular basis. Additionally, it should consistently enhance these schemes to align with the evolving requirements of the industry, as well as to contribute to the political, economic, and cultural advancement of the nation. Alternatively, these schemes will solely contribute to the escalation of government expenditures without yielding any advantages. In order to achieve professional success, individuals should capitalize on the various benefit programs offered by the government.

To improve their chances of finding gainful employment in the formal economy, young people from rural areas who identify as members of the backward communities (SC and ST) must make greater efforts to overcome the challenges they face and acquire more advanced skills. While it will take time for young people from SC and ST communities living in rural areas to undergo a complete transformation, this process can be sped up by identifying and providing them with targeted training programs and mentorship opportunities. These initiatives can help them acquire the necessary skills and knowledge to compete in the formal job market. Additionally, creating awareness campaigns and sensitizing employers about the potential of these young individuals can also contribute to breaking down the discriminatory barriers they often face. By addressing these challenges and empowering young people from SC and ST communities, we can work towards a more inclusive and equitable society where everyone has equal access to opportunities and economic growth. However, the pace of this transformation can be expedited by effectively addressing the various challenges and barriers they encounter.

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Sustainable Development Goals and Multi-Dimensional Poverty Index in India

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Abstract

The paper describes the concept and measurement of multi-dimensional poverty index and analyses quantitatively in India along with across the world. It finds a significant negative relation between growth and multidimensional poverty index. The paper studies exclusively on the several researches on MPI and its improvement over the income poverty. The paper found that Sub-Saharan Africa is the poorest region and Chand is the poorest country in the world according to MPI. In 2015-16, India's multi-dimensional poverty index was 0.117 which was reduced to 0.066 in 2019-21 i.e., poverty has reduced to a certain limit. In rural area, MPI decreased from 0.154 to 0.086 and in urban area MPI decreased from 0.039 to 0.023 during 2015-16-2019-21 which implies that rural poverty has reduced much higher than urban area. The paper showed a clear link between sustainable development goals and MPI of India based on the approach of NITI Aayog where SDG-1 to SDG-6, SDG-10 and SDG-13 were emphasised.

Keywords: *Multi-dimensional Poverty Index, Sustainable Development Goals, Head Count Ratio, Intensity of Poverty, indicators of deprivations*

JEL classification codes: *I00, I20, I32, O20*

Introduction

Multi-dimensional Poverty Index is developed by UNDP and Oxford Poverty & Human Development Initiative in 2010 taking 2.15$ per day per person as international poverty line at 2017 PPP. It measures the percentage of households in a country deprived along three dimensions health, education and standard of living to asses an integrated picture of poverty. It is rigorous, unique and flexible. It is easy to calculate. The index can be compared between regions and nations and among ethnic groups and communities. It is an improvement over HPI and viewed as a measure of low wellbeing rather than poverty and prevents substitution between dimensions (Walker,2015). It assumes three dimensions, namely, health, education, and living standard in which the indicators of health are nutrition and child mortality whose weights were considered as one sixth (1/6), the indicators of education are years of schooling and school attendance whose weights are one sixth (1/6), and the indicators of living standard are cooking fuel, sanitation, drinking water, electricity, housing and assets whose weights are one eighteenth (1/18) each. Nutrition is aligned to SDG-2, child mortality is related to SDG-3, years of schooling and school attendance are related to SDG-4, cooking fuel and electricity are linked to SDG-7, sanitation and drinking water are aligned to SDG-6, housing is associated with SDG-11 and asset is related with SDG-1 respectively. MPI reflects the multiple deprivations that poor people face in the areas of education, health, and living standards. UNDP surveyed 104 countries in 2010 taking the Demographic and Health Survey (DHS), the Multiple Indicators Cluster Survey (MICS), and the World Health Survey (WHS) and found out MPI.

Measurement of MPI

MPI = H x A where MPI=multi-dimensional poverty index, H= head count ratio, A=intensity of poverty.

$H=q/n$ where q=number of persons who are multi-dimensionally poor, n=total population,

A= where for poor c≥33.3%, $c_i(k)$, the deprivation scores are summed and divided by the total number of poor persons.

In MPI, there are 3 dimensions, health, education, and living standard. Health has two indicators, namely, nutrition and child mortality, education has two indicators, namely, years of schooling and school attendance, living standard has 6 indicators, namely, cooking fuel, sanitation, drinking water, electricity, housing, and assets etc.

Growth and MPI

Seth and Alkire (2021) examined the relationship between growth and MPI and found a weak negative correlation where Burchi et al. (2019) also found weak and negative correlation examining in 51 low-and middle-income countries. Santos, Dabus and Delbianco (2019) studied a panel of 78 countries for the period from 1999 to 2014 and observed that growth negatively affects the global MPI while the elasticity was less than one. Santos et al. (2019) took 91 countries during 1990-2018 to estimate the poverty-growth elasticity, to examine whether this elasticity varies across time, based on initial conditions, and to compare the elasticity for income and multidimensional poverty and found statistically significant negative effect on multidimensional poverty but with an elasticity much lower than one.

Balasubramanian, Burchi and Malerba (2023) used Global Correlation Sensitive Poverty Index (G-CSPI) and the Global M_0 (G-M_0) on 91 low- and middle-income countries from 1990 to 2018 to assess the elasticity of multidimensional poverty to growth to estimate the growth elasticity of multidimensional poverty using the first difference estimator. The study found that the growth elasticity of multidimensional poverty is -0.46 while using the G-CSPI and -0.35 while using the G-M_0 which implied that a 10 % increase in GDP decreases multidimensional poverty by 4.6 % using G-CSPI or 3.5 %, using G-M_0. The study incorporated three equally weighted fundamental dimensions of poverty: education, work, and health. The study used MPI following Alkire and Santos (2014) and the World Bank's (2018) recent multidimensional poverty measure. It assumed

$$CSPI = \frac{1}{n}\sum_{i=1}^{n}[c_i(x_i;z)]^2$$

where given n individual i=1,2,……..n. C_i is the sum of deprivations suffered by individuals I divided by total number of deprivations. This individual weighted deprivation count is dependent on the vectors of individual achievements [$x_i=(x_{i1};x_{i2};x_{i3})$] and dimensional cut-offs [$z=(z_1;z_2;z_3)$]. Thus, the CSPI is the average of the squared individual weighted deprivation counts. If there is a transfer from a poor to a less poor individual, the CSPI increases, whereas the M_0 remains unchanged or even decreases.

The result also found that the income poverty-growth elasticity was much larger in magnitude than the multidimensional poverty-growth elasticity, regardless of the multidimensional poverty measurement. The estimated elasticity of the changes in the income squared poverty gap to economic growth was -2.36, compared to -0.46 using the G-CSPI; and -2.3, compared to -0.35 using the G-M_0. Therefore, the results for income poverty are five to six times greater, and become even eight times larger using the headcount ratios. As regards heterogeneity, empirical studies on income poverty showed that poverty reacts less to growth in countries with higher initial poverty. The first difference estimate regression model of this study is divided into three distinct analyses:(i) the association between the changes in multidimensional poverty and economic growth, (ii) robustness of the poverty-growth elasticity by controlling for changes in inequality, (iii) whether the cross-country poverty growth elasticity significantly varies over time.

Some Important Researches in MPI

There are a few researches on the multi-dimensional poverty index in India and across the globe in which the paper concentrated on the following research papers. Alkire and Seth (2008) applied the methodology of 2002 on Below the Poverty Line (BPL) using NFHS to calculate MPI for India and found that 12 per cent of the poor sample population and 33 per cent of the extreme poor could be misclassified as non-poor by the pseudo-BPL method.

Dehury and Mohanty (2015) used the Indian Human Development Survey (IHDS) data of 2004-05, estimated and decomposed the multidimensional poverty dynamics in 84 natural regions of India where MPI was measured by indices of health, knowledge, income, employment and household environment. Observations revealed that 50% of India's population is multidimensional poor with large regional variations. In Mahanadi basin more than 70% of the population is multidimensional poor. On the other hand, it is less than 10% in the coastal regions of Maharashtra, Delhi, Goa, the mountainous region of Jammu and Kashmir, the Hills region and Plains region of Manipur, Puducherry and Sikkim.

Duclos and Tiberti (2016) theorized that MPI should obey the properties of continuity, monotonicity, and sensitivity to multiple deprivation. But there is discontinuity in MPI such as i) a transfer from a richer

to a poorer individual in one dimension, ii) a decrease in the inequality in one component dimension among the poor, iii) a simultaneous decrease in inequality across all dimensions, or iv) a fall in the incidence of multiple deprivation respectively.

Dotter and Klasen (2017) proposed some changes on the empirical implementation such as (i) to exclude WHS as one of the data sources, (ii) to drop the BMI as a nutrition indicator, and to change the age ranges and cutoffs for the education and mortality indicators. Author discussed on different approaches to deal with the large share of households where information on an MPI indicator is missing and also analysed empirical relevance of the changes applying Demographic and Health Surveys (DHS) for Armenia, Ethiopia, and India which showed an improvement than current formulation. Anyone can investigate further using large countries.

Santos (2019) emphasised the designing a national MPI. First of all, it is required to define the purpose of the measure followed by setting the space, then selecting the unit of identification, the dimensions and indicators. If the selected unit of identification is the household, then the procedure for transforming individual-level indicators into household is not trivial because it affects the number of people identified as poor. The inclusion or non-inclusion of income among MPI indicators also has pros and cons that need to be balanced. Other central decisions are to set weights and to define the poverty cutoff. Then verify through empirical analysis, via robustness, sensitivity and bias checks.

Tripathi and Yenneti (2019) measured MPI in India taking National Sample Survey on consumption expenditure for the period of 2004-05 and 2011-12 and observed that 62.2% people are poor in 2004-05 which decreased to 38.4% in 2011-12 in which rural poverty declined from 60.2% in 2004-05 to 16.7% in 2011-12 and urban poverty declined to 20% in 201-12 from 33.4% in 2004-05. At state level analysis suggests that Jharkhand, Uttar Pradesh, Rajasthan, Orissa, and Bihar had the higher multidimensional rural poverty, whereas Kerala, Mizoram, Nagaland, Punjab and Maharashtra had the lower level of poverty as of 2004-05. But, in 2011-12, Punjab, Kerala, Himachal Pradesh, Haryana and Jammu & Kashmir had lower level of poverty whereas Manipur, Arunachal Pradesh, Jharkhand, Orissa and Uttar Pradesh had higher level of poverty. Nagaland, Mizoram, Himachal Pradesh, Jammu & Kashmir, and Kerala witnessed lower urban poverty whereas Chhattisgarh, Arunachal Pradesh, Bihar, Manipur and Uttar Pradesh witnessed higher urban poverty ratio in 2004-05. Meghalaya, Orissa, Bihar, Jharkhand and Uttar Pradesh witnessed higher urban headcount poverty ratio while Himachal Pradesh, Haryana, Kerala, Punjab and Tamil Nadu witnessed lower urban poverty in 2011-12.

Mitchell and Macció (2021) applied Alkire-Foster measure of deprivation of MPI in Argentina to the evaluation of the NGO TECHO's emergency housing programme in physical health, psychological health, sleep, privacy, interpersonal relations and security and found that there is a large reduction in multidimensional deprivation in dimensions related to the built environment where MPI declined from 69% to 41% which is robust to variations in the selection of deprivation indicators (Privacy, interpersonal relations and psychological health), indicator weights and poverty threshold. This result provides clear evidence of the urgent need for public sector actions to improve habitat in informal settlements producing a de-clustering of deprivation among the most deprived. Sensitivity analyses demonstrate the robustness of the results to changes in the criteria used to construct the multidimensional poverty measure.

According to Hlasny, Asadullah and Sabra (2022) MPI has emerged as an international harmonized indicator simultaneously capturing overlapping deprivations in multiple dimensions of well-being –health, education, and living standards. Regional and global MPIs have been linked with the SDGs as they address concurrently multiple SDGs and their indicators. Multidimension deprivation is an improvement to alleviate socially disadvantaged group. Presently, MPI is approved and implemented with the support of national leadership and civil society. MPI can address both spatial and horizontal inequality, and can be helpful for developing specific actions tailored to local needs. MPI is used in formal design, enactment and evaluation of social policies and programs. In Asia, MPI has been utilising to fulfil the targets of SDG-1(poverty), SDG-2(food security), SDG-4(education) and SDG-6(water and sanitation) respectively. MPI also has some drawbacks. For instance, flow data are not available for all indicators, including standard MPI indicators (e.g., child mortality irrespective of the time of death), household outputs (e.g., schooling years), and inputs (e.g., indoor cooking fuel), health data are inadequate and overlook some groups' deprivations particularly for nutrition.

On the basis of China Household Tracking Survey (CFPS)-2018, Wang, Xiao, and Liu (2023) examined the impact of social capital on Multidimensional Poverty of rural households in China and found that MPI of China was 0.103 and people below MPI are 24.94%. The adult education, health, and chronic diseases reached highest incidence of 42.06%, 37.65%, and 29.90% respectively. Social capital can significantly reduce the probability of multidimensional poverty in rural households. Moreover, social network significantly and negatively affects the occurrence of multidimensional poverty in

rural households and social trust in neighbours has a significant negative effect on multidimensional poverty in rural households at the 1% level, and social prestige is positively related to multidimensional poverty in rural households. The multidimensional poverty in rural households is significantly associated with age of household head, household size, and income from working outside the home.

Global MPI

Globally, multi-dimensional poverty index is severe in Sub-Saharan Africa showing 0.262 with 49.5% people live below MPI followed by South Asia scoring 0.091with 20.5% people, the developing countries scored MPI as 0.088 with 18.2% people live below MPI where Europe and the Central Asia showed lowest having 0.004 with 1.2% people below it. In decomposition of MPI, the headcount ratio revealed that 1116713000 people live below poverty line in developing countries followed by 533772000 people in Sub-Saharan Africa,389488000 people in South Asia,105845000 people in East Asia and pacific and 52636000 people in Arab States respectively. And the intensity of poverty revealed that 52.9% people live below poverty line in Sub-Saharan Africa followed by 48.9% in Arab States,48.5% in developing countries, 44.5% in South Asia, 43.1% in Latin America and Carebbeans,42.4% in East Asia and pacific regions respectively. People in severe multi-dimensional poverty stood highest in Sub-Saharan Africa,27.9% followed by developing countries 7.9%, South Asia and Arab states showing 6.9% followed by 1.5% in Latin America and Caribbeans. The contribution of deprivation in dimension to overall multi-dimensional poverty from health is severe in Europe and Central Asia showing 66.7% followed by 33.5% in Latin America and Carebbeans,28.1% in East Asia and Pacific,27.9% in South Asia,26.1% in Arab States and 24.2% in developing countries respectively. But deprivation from education occur severely in East Asia and Pacific having 35.8% followed by Arab States 34.3%, South Asia 33.7%, developing countries 31.6%, Sub-Saharan Africa 29.6%, Latin America and Caribbeans 27.6%, and 16.8% in Europe and Central Asia respectively. The deprivation from standard of living is severe in Sub-Saharan Africa having 49.8% followed by developing countries 44.2%, Arab States 39.7%, Latin America and Caribbean countries 38.9%, South Asia 38.3%, East Asia and Pacific 36.1% and so on. According to national poverty line,41.1% Sub-Saharan people live below the poverty line followed by Latin America and Caribbeans 37.9%, Arab States 23.4%, South Asia 22.6%, developing countries 20.1% and Europe and Central Asia 12.2% respectively. According to international poverty line of 2.15$ PPP per day, Sub-Saharan Africa showed 37.4% people live below the poverty line followed by developing countries 10.5%, South Asia 9.2%, Latin America and Caribbeans 4.9% and Arab States 4.7% respectively. (Table 1).

Table 1   Indicator Based Multi-Dimensional Poverty

	Arab states	East Asia+Pacific	Europe+Central Asia	Latin America+Caribbeans	South Asia	Sub-Saharan Africa	Developing countries
MPI	0.074	0.022	0.004	0.024	0.091	0.262	0.088
People%	15.1%	5.1%	1.2%	5.6%	20.5%	49.5%	18.2%
H(2021) in 000	52636	105845	1713	33258	389488	533772	1116713
A(%)	48.9%	42.4%	37.1%	43.1%	44.6%	52.9%	48.5%
Inequality among poor	0.019	0.008	0.003	0.011	0.014	0.022	0.017
People in severe MPI	6.9%	0.9%	0.1%	1.5%	6.9%	27.9%	7.9%
Health	26.1%	28.1%	66.7%	33.5%	27.9%	20.6%	24.2%
Education	34.3%	35.8%	16.5%	27.6%	33.7%	29.6%	31.6%
Standard of living	39.7%	36.1%	16.8%	38.9%	38.3%	49.8%	44.2%
People National poverty	23.4%	3.8%	12.2%	37.9%	22.6%	41.1%	20.1%
People 2.15$ PPP	4.7%	0.8%	0.7%	4.9%	9.2%	37.4%	10.5%

Source-UNDP-2023

Among the developing countries, Multi-dimensional Poverty Index is the highest in Chand which was obtained as 0.517 followed by Central African Republic having MPI as 0.461, Burundi having MPI as 0.409,Madagascar having MPI as 0.386,Mali having MPI as 0.376 respectively where percentage of population deprived in health, education and standard of living were found as 19.1%,36.6%,44.3% for Chad,20.2%,27.8%,52.0% for Central African Republic,23.8%,27.2%,49.0% for Burundi,17.8%,31.6%, 50.6% for Madagascar, and 19.6%,41.1%,39.3% for Mali. The same observations were found in case of HCR (%) which implies that Chad showed highest HCR as 84.2% followed by CAR having HCR as 80.4%, Burundi 75.1%, Ethiopia 68.7%, Madagascar 68.4% and Mali 68.3% and so on. On the contrary, according to international poverty line, percentage of population below PPP 2.15$ per day per man during 2011-21was highest in Madagascar [80.7%] followed by Malawi [70.1%], Congo [69.7%], Burundi [65.1%], Mozambique [64.6%] respectively. According to national poverty line, Madagascar secured first rank having 70.7% population living below the poverty line, followed by Sao Tome Principe, 66.7%, Burundi, 64.9%, Congo,63.9%, and Sierra Leone ,56.8% respectively.

In South East Asia, highest MPI was seen in Pakistan having MPI as 0.198, followed by Lao PDR showing 0.108, Bangladesh as 0.104, Nepal as 0.074, and India as 0.069 respectively. On the other hand, the lowest MPI was observed in Thailand having MPI as 0.002, followed by Maldives 0.003, Vietnam 0.008 and Indonesia showing MPI as 0.014 respectively. Their percentage of population deprived in health, education and standard of living were seen as 27.6%,41.3% and 31.1% for Pakistan, followed by 21.5%,39.7% and 38.8% for Lao PDR, 17.3%, 37.6%, 45.1% for Bangladesh, 23.2%,33.9%, and 43.0% for Nepal, 32.2%, 2 8 . 2 % , and 39.7% for India and so on. Incidentally, according to HCR, the ranking order somehow changed marginally as follows: Pakistan-38.3%, Bangladesh-24.6%, Lao PDR-23.1, Nepal-17.5%, and India-16.4%. Interesting to note that according to international poverty line, percentage of population below PPP 2.15$ per day per man during 2011-21, Bangladesh showed 13.5% people are living below poverty line compared with 10.0% in India,7.1% in Lao PDR and 4.9% in Pakistan.

Percentage of population living in severe MPI was found in Chad [64.6%] followed by Central African Republic [55.8%], Burundi [46.1%], Madagascar [45.8%], Mali [44.7%], Guinea [43.4%], Mozambique [43.0%], Ethiopia [41.9%], and Benin [40.9%] respectively.

There is no severe MPI in the countries like Argentina, Georgia, Costa Rica, Jordon, Kyrgyzstan, Maldives, Palestine, Serbia, Seychelles, Thailand, Tonga,

Turkmenistan, Tuvalu and Uzbekistan respectively. But their health and education deprivations are very high although their values of MPI are low. Therefore, other indicators on the health and education deprivations are to be searched out by using suitable methodology that can clarify MPI fully.

Percentage of population deprivation in health in MPI was found highest in Uzbekistan [94.5%] followed by Turkmenistan [82.4%], Maldives [80.7%], Argentina [69.7%], Seychelles [66.8%], Kyrgyzstan [64.6%], and Palestine [62.9%] respectively but those countries were recorded very negligible value of MPI which ranges from 0.001 to 0.006.

Again, percentage of population deprivation in health in MPI was found highest in Tunisia [61.6%] followed by Iraq[60.9%],Albania[55.1%], Jordon [53.5%], North Macedonia [52.6%], Algeria [49.9%], Senegal [48.4%], Cambodia[48.0%], Morocco [46.8%], and Dominican [48.0%] whose MPI ranges from 0.001 to 0.070 except Senegal(MPI=0.263) where it is to be noted that all are Muslim countries except Cambodia.

In case of percentage of population deprivation in standard of living in MPI, the highest rank was occupied by Papua New Guinea having 65.3% followed by Lesotho, 60.0%, Zimbabwe, 59.2%, Haiti,57.0%, Malawi, 55.9%, Ethiopia, 54.5%, Rwanda, 54.4%, Zambia, 53.5% etc. which were influenced tremendously by the values of MPI on those countries that ranged from 0.084 to 0.293 to 0.367(UNDP,2023).

Multi-Dimensional Poverty Index of India

In India, in 2015-16, Headcount Ratio was 24.85% and Intensity of poverty was 47.14% which revealed multi-dimensional poverty index equals 0.117 which was reduced to 0.066 in 2019-21 where Headcount ratio was 14.96% and intensity of poverty was 44.39% (Table No-2).

Table 2   Multi-Dimensional Poverty Index of India

	Headcount Ratio	Intensity of Poverty	MPI=HxA
2015-16	24.85%	47.14%	0.117
2019-21	14.96%	44.39%	0.066

Source-NITI Aayog, 2023

In comparing multi-dimensional poverty index of India in context of rural and urban area during 2015-16-2019-21, the paper finds that both rural and urban areas were able to reduce the MPI. In rural area, head count ratio and intensity of poverty were 32.59% and 47.38% which transform MPI as 0.154 in 2015-16 which decreased to 0.086 in 2019-21 where headcount ratio and intensity of poverty were 19.28% and 44.55% respectively. On the

other hand, in urban area head count ratio and intensity of poverty were 8.65% and 45.27% which transform MPI as 0.039 in 2015-16 which decreased to 0.023 in 2019-21 where headcount ratio and intensity of poverty were 5.27% and 43.10% respectively. (Table 3)

Table 3   India's MPI-Rural vs Urban

	RURAL			URBAN		
	MPI	**H(%)**	**A(%)**	**MPI**	**H(%)**	**A(%)**
NFHS-5 (2019-21)	0.086	19.28%	44.55%	0.023	5.27%	43.10%
NFHS-4 (2015-16)	0.154	32.59%	47.38%	0.039	8.65%	45.27%

Source-NITI Aayog, 2023

According to the indicators of multi-dimensional poverty index in the dimensions of health, education and standard of living in India, the deprivation of India has reduced to some extents in every indicator however little. In 2015-16, nutrition deprivation was 37.60% which reduced to 31.52% in 2019-21, Child & adolescence mortality deprivation was reduced from 2.69% to 2.06%, Maternal health deprivation was reduced from 22.58% to 19.17% respectively. In education sector, deprivation of years of schooling was 13.86% in 2015-16 which decreased to 11.40% in 2019-21, deprivation of school attendance was 6.4% in 2015-16 which decreased to 5.27% in 2019-21.In standard of living, the deprivation in cooking fuel was 58.47% in 2015-16 which reduced to 43.90% in 2019-21, the deprivation in sanitation was 51.88% in 2015-16 which reduced to 30.13% in 2019-21, the deprivation in drinking water was 10.92% in 2015-16 which decreased to 7.32% in 2019-21, the deprivation in electricity was 12.16% in 2015-16 which reduced to 3.27% in 2019-21, the deprivation in housing was 45.65% in 2015-16 which dropped to 41.37% in 2019-21, the deprivation in assets was 13.97% in 2015-16 which fell down to 10.16% in 2019-21,and the deprivation in bank account was 9.66% in 2015-16 which reduced to 3.69% in 2019-21respectively (Table No-4).

Table 4   Indicator Based Deprivation of India

	NFHS-4(2015-16)	NFHS-5(2019-21)
Health		
Nutrition	37.60%	31.52%
Child & adolescence mortality	2.69%	2.06%
Maternal health	22.58%	19.17%
Education		
Years of schooling	13.86%	11.40%
School attendance	6.40%	5.27%
Standard of living		
Cooking fuel	58.47%	43.90%
Sanitation	51.88%	30.13%
Drinking water	10.92%	7.32%
Electricity	12.16%	3.27%
Housing	45.65%	41.37%
Assets	13.97%	10.16%
Bank accounts	9.66%	3.69%

Source-NITI Aayog, 2023

According to state-wise multi-dimensional poverty index in India, the minimum deprivation or the lowest MPI was observed in Kerala having 0.003 in 2015-16 followed by Goa having 0.015, Sikkim 0.016, Tamil Nadu having 0.019, Punjab 0.024 respectively. On the other hand, maximum deprivation or highest MPI was observed in Bihar showing 0.265 followed by Jharkhand 0.202, Uttar Pradesh 0.179 and Madhya Pradesh 0.173 respectively. But in 2019-21, the lowest MPI was observed in Kerala having 0.002, followed by Goa having 0.003, Tamil Nadu 0.009, Sikkim 0.011, Punjab and Himachal Pradesh 0.020, Mizoram and Telangana 0.024 and Andhra Pradesh 0.025 respectively. Conversely, in 2019-21 the highest MPI was observed in Bihar showing 0.160 followed by Meghalaya 0.133, Jharkhand 0.131, Uttar Pradesh 0.103, Madhya Pradesh 0.090 respectively. All the states have improved their MPI to a greater extent (Niti Aayog,2023).

Policies and Programmes

Ministry of statistics and programme implementation, Govt. of India (2023) has completed its SDG -National Indicator Framework, Progress Report-2023 where India sets 17 sustainable development goals in connection with the UNDPs SDGs in which India's SDG-1 to SDG-6, SDG-10 and SDG-13 are directly and indirectly related with multi-dimensional poverty index of India by which poverty alleviation can be implemented properly.

In SDG-1, India's extreme poverty as per US$1.25 per day per person was 5.05 in rural area and 2.70 in urban area as poverty gap ratio in 2011-12, which is targeted to zero in 2030. According to national poverty line, India's poverty was 21.92% in 2011-12 which will be reduced to half by 2030.India's health insurance coverage was 28.70% in 2011-12 and 41.00% in 2019-21 and by 2030 a substantial coverage will be done. In ICDS, MGNREGA, SHG, PMMVY, assistance to senior citizens, EPS, NPS, access of basic services, provision of telephone, the same commitment was assured by 2030. India committed to build the resilience of the poor and those in vulnerable

situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters with in 2030. India will ensure significant mobilization of resources from a variety of sources through enhanced development co-operation, in order to provide adequate and predictable means to implement programmes and policies to end poverty in all its dimensions.

According to SDG-2,India committed to end hunger and ensure safe, nutritious and sufficient food for poor within 2030 when India's 32.10 % children aged under 5 years in 2019-21 remain underweight,98.48% of people in 2022-23 are the beneficiaries of National Food Security Act 2013.In 2019-21,35.50% of children under age 5 years are stunted,19.3% are wasting,3.4% are underweight due to malnutrition and 57.0% pregnant women aged 15-49 have been fallen into anaemia, 18.70% of women's Body Mass Index (BMI) is below normal, 67.10% of children aged 6-59 months are anaemic where India aimed at zero malnutrition by 2030.Productivity of rice, wheat, Gross Value Added in agriculture per worker, (in Rs 84621 in 2022-23), Ratio of institutional credit to agriculture to the agriculture output is1.10 in 2019-21which will be doubled in 2030. Proportion of Net Sown Area to Cultivable land in 2019-20 is 77.73, percentage of net area under organic farming in 2021-22 is 3.91 will be increased subsequently by 2030.In 2022-23, 482633 plants, 294504 animals, 17.92 proportions of local breeds classified as being at risk of extinction, where India committed to maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species by 2020.

According to SDG-3,India will reduce the global maternal mortality ratio to less than 70 per 1,00,000 live births (presently 9700000 in 2018-20) by 2030, 89.40 percentage of births attended by skilled health personnel (Period 5 years) in 2019-21, 90.90 percentage of births attended by skilled health personnel (Period 1 year) in 2019-21, 58.5 percentage of women aged 15-49 years with a live birth, for last birth, who received antenatal care, four times or more (Period 5 years/1 year) in 2019-21,will be reduced substantially by 2030. In 2020, under-five mortality rate, (per 1,000 live births) of India is 32, neonatal mortality rate (per 1,000 live births) is 20,which will be changed to 12 and 25 by 2030. Now in 2022, number of new HIV infections per 1,000 uninfected population is 0.05, Tuberculosis incidence per 1,00,000 population is 197 in 2021, Malaria incidence per 1,000 population is 0.13 in 2022, Prevalence of Hepatitis 'B' per 1,00,000 population is 850 in 2021, Case Fatality Ratio of Dengue is 0.12 in 2022,where India will end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water- borne

diseases and other communicable diseases by 2030. India will achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all. By 2030, India will substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination. India will increase health financing and the recruitment, development, training and retention of the health workforce in developing countries, especially in least developed countries and small island developing states, support the research and development of vaccines and medicines for the communicable and non-communicable diseases, strengthen the implementation of the World Health Organization Framework Convention on Tobacco Control in all countries respectively.

In SDG-4,India wants to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all for which India will provide complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes for all girls and boys by 2030. Presently,India's Gross Enrolment Ratio in higher secondary education is 57.6 in 2021-22, Net Enrolment Ratio in primary and upper primary education are 88.6 and 71.3 in 2021-22, Adjusted Net Enrolment Ratio in primary, upper primary and secondary education are 99.1,87.3,64.7 in 2021-22. By 2030, India will (i)ensure

access on care and pre-primary education for all boys and girls so that they are ready for primary education, (ii) ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education including university, (iii) eliminate gender disparities in education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations, (iv) increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship. Moreover, by 2030, India will ensure to achieve literacy for all youths and adults, both men and women, ensure all learners to acquire the knowledge and skills needed to promote sustainable development, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development. India will build and upgrade education facilities for all children including disability and gender sensitive, safe, non-violent, inclusive and effective learning environments for all.

In SDG-5, India will achieve gender equality and empower all women and girls and will end all forms of discrimination against all women and girls. India will (i)eliminate all forms of violence against all women and girls in the public and private spheres, including trafficking and sexual and other types of exploitation, (ii)eliminate all harmful practices, such as child, early and forced marriage and female genital mutilation, (iii) ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life, (iv) recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate, (v) ensure universal access to sexual and reproductive health and reproductive rights as agreed in the International Conference on population and Development and the Beijing platform for action and the outcome documents of their review conferences, (vi) undertake reforms to give women equal rights to economic resources, as well as access to ownership and control over land and other forms of property, financial services, inheritance and natural resources as per national laws, (vii) enhance the use of enabling technology especially in information and communications technology, (viii) to promote the empowerment of women, (ix) adopt and strengthen sound policies and enforceable legislation for the promotion of gender equality and the empowerment of all women and girls at all levels.

In SDG-6,India's successive steps are (i) to ensure availability and sustainable management of water and sanitation for all,(ii) to provide universal and equitable access to safe and affordable drinking water for all as against 61.52% in 2021-22,(iii) to achieve access to adequate and equitable sanitation and hygiene for all, (iv) to end open defecation with special emphasis on women and girls, (v) to improve water quality by reducing pollution,(vi) to eliminate dumping and minimise hazardous chemicals (vi) to half untreated wastewater and to recycle for safe reuse, (vii) to supply freshwater in scarcity areas, (viii) to implement integrated water resources management at all levels,(ix) to protect and restore water-related ecosystems, (x) to expand international cooperation in water- and sanitation-related activities and programmes with other countries, (xi) to support and strengthen the participation of local communities in improving water and sanitation management by 2030.

In SDG-10, India will reduce inequality within and among countries and by 2030, it will progressively achieve and sustain income growth of the bottom 40 per cent of the population at a rate higher than the national average, and empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status. Presently, India's Gini coefficient in rural and urban area are 0.283,and 0.363 in 2011-12,and percentage of people living below 50 per cent of median per capita household expenditure in rural and urban area are 4.28 and 10.89 in 2011-12, growth rates of household expenditure per capita among the bottom 40 per cent of the population and the total population in rural and urban area are 13.61 and 13.35 in 2011-12.India will (i) adopt fiscal, wage and social protection policies, (ii) progressively achieve greater equality, (iii)improve the regulation and monitoring of global financial markets and institutions and (iv)strengthen the implementation of such regulations, facilitate orderly, safe, regular and responsible migration and mobility of people, including through the implementation of planned and well-managed migration policies, (v) implement the principle of special and differential treatment for developing countries, in particular least developed countries, in accordance with WTO agreements, encourage ODA and financial flows, including FDI, to states where the need is greatest, especially African countries, small island developing states and landlocked developing countries according to their national plans and programmes, and (vi) will reduce to less than 3 per cent the transaction costs of migrant remittances and eliminate remittance corridors with costs higher than 5 per cent by 2030.

In SDG-13,India aims to take urgent action to combat climate change and its impacts and strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries because number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population in India was 1,0738.97 in 2018,the value of Sendai Framework for Disaster Risk Reduction 2015-2030 in India was 1.0 during 2019-23, proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies of India is 0.92 in 2022. India will improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning system. India will integrate climate change measures into national policies, strategies and planning and it will promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing states, including focusing on women, youth and local and marginalized communities through climate finance target of UNFCCC to operationalise Green Climate Fund.

Conclusion

The paper found some limitations of MPI which are (i) indicators of years of schooling, cooking fuel, child mortality are stock data where flow data are not available, (ii)data on health are weak and overlook some group deprivations, (iii) missing data should be carefully handled, (iv) intra-household inequality may be severe since all are not reflected, (v) MPI does not measure inequality among poor, (vi) data limited to direct cross-country comparability. Moreover, the review of UNICEF (2021) concluded that (1) more awareness and changing language and concept of poverty is required because child multidimensional poverty has different scale and intensity problems. (2) Policy measurement can be identified because disparities are different across geographical areas so that investment particular will be different in sectors. Thereby both child poverty and social protection can be preserved keeping in mind for long term perspective planning for SDG.

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Navigating the Ecosystem of Sustainable Finance Research: A Dynamic Bibliometric Analysis

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Abstract

This methodology outlines the mapping of global sustainable finance research over three decades, utilizing Scopus database data up to 2023. Employing bibliometric methods and visualization tools, the study explores research trends, co-author-ship, and co-occurrence. Notable trends include a peak in paper publications in 2022, and strong research output from the US, UK, and India. Co-citation and co-word analyses provide insights into theme associations. Notably, the United States led the list in terms of research output, followed closely by the United Kingdom and India. The increasing attention to the subject globally is illustrated through the steady rise in article output over the years. The conceptual structure analysis sheds light on the interconnectedness and relationships among scholarly documents. Co-citation and co-word analysis offered insights into the associations and the relationships among various themes and concepts discussed in the research.

Keywords: Sustainable Finance, Bibliometric Analysis, Co-citation analysis, Co-word analysis, Theme associations.

Introduction

Over the past several decades, there has been a significant increase in interest between financial intermediaries and institutional investors regarding sustainable finance. They are now actively seeking investment strategies that take into account various metrics related to environmental sustainability, social responsibility, and the governance mechanisms of the companies they invest in (Mashari et al., 2023; Pompella & Costantino, 2023)which requires sustainable financial policy arrangements from the government and the private sector as an instrument to support nationally determined contributions under the Paris Agreement. However, only a few review articles look into the specific combination of green finance (also known as sustainable financing. "The 17 Sustainable Development Goals (SDGs), adopted by all United Nations Member States in 2015 as part of the 2030 Agenda for Sustainable Development, serve as a global call to action." Their aim is to "eradicate poverty, safeguard the planet, and enhance the well-being and opportunities for people worldwide." These goals are set to be achieved by 2030 (United Nations, 2020).

According to (Whiteman et al., 2013), the idea of sustainable finance has developed alongside the broader concept of business sustainability in recent decades. The foundation for this discussion is based on the typology for business sustainability crafted by (Dyllick & Muff, 2016). The evolution of sustainable finance is characterized by a

shift in classification from focusing solely on 'economic' considerations to encompassing 'economic, societal, and environmental' considerations (Schoenmaker, 2017).

The idea of sustainable finance is remarkably extensive, covering a wide range of dimensions related to achieving the financial and the investment objectives through sustainable means. According to the European Commission (2021), "sustainable finance involves an ongoing process of taking into account environmental, social, and governance (ESG) factors when making financial and investment decisions." However, this definition, solely focused on ESG factors, is quite limited, necessitating a more comprehensive and inclusive approach that addresses sustainability on a broader scale. In light of this, we propose that sustainable finance should encompass all activities and factors that contribute to making finance sustainable and supporting overall sustainability (Kumar et al., 2022).

This proposed definition aligns with the diverse objectives of various stakeholders, including the European Commission's emphasis on ESG factors and the United Nations' Sustainable Development Goals (SDGs). By adopting such a comprehensive perspective, sustainable finance can better serve as a driving force towards a more sustainable future (Liang & Renneboog, 2020).

Global climate change is significantly influenced by global warming, and in order to avoid the most disastrous consequences, it is imperative to reduce greenhouse gas (GHG) emissions. To tackle this problem, the United Nations Framework Convention on Climate Change (UNFCCC) convened the COP-21 meeting and adopted the Paris Agreement, in which officials from across the globe collectively committed to restricting the rise in the average global temperature to 1.5 degrees Celsius above pre-industrial levels.

Recently, the financial dimension has gained significant prominence, especially following the COP-27 conference. During this conference, there was a strong emphasis on the need for a considerable increase in financial resources to facilitate the execution of initiatives laid out in the nationally determined contributions (NDCs) and long-term strategies (Mikes & New, 2023; Motorniuk et al., 2023; Narayanan et al., 2023). Promisingly, there has been observable advancement within the financial industry, as investment portfolios are being modified to support the shift towards a "net-zero economy." Nevertheless, there is an urgent requirement to take further action in order to generate the substantial funds needed for the realization of environmentally friendly, low-carbon development routes (Han et al., 2023; Mashari et al., 2023; Nguyen & Nguyen, 2023; Savoia et al., 2023). Now, all parties involved are genuinely concerned about reducing greenhouse gas emissions through financial incentives, which makes the situation all the more captivating (Baines & Hager, 2023; Fu et al., 2023) . The acknowledgment of the difficulties posed by climate preservation has prompted the introduction of legal and preventative actions aimed at promoting an economy resilient to climate change (Azudin et al., 2023; Ben Belgacem et al., 2023; Bužinskė & Stankevičienė, 2023; Narayanan et al., 2023). Moreover, investors have reacted to environmental concerns by integrating environmental, social, and governance (ESG) factors into their decision-making procedures (Battisti, 2023; Pompella & Costantino, 2023).

The inception of sustainable finance has marked a significant milestone in the realm of financial systems, setting the stage for the emergence and growth of green finance(H. Chen et al., 2023; Mashari et al., 2023) commercial credit has partially replaced the role of formal finance and facilitated the development of the private economy and even the country, thus making commercial credit an important entry point for understanding and promoting sustainable economic development. Taking the Hangzhou Bay Greater Bay Area as a case study, based on the City Business Credit Environment Index (CEI. This transformative journey is characterized by a concerted effort to integrate environmental, social, and governance (ESG) considerations into financial decision-making processes(M. Chen et al., 2023; Junjie et al., 2023). As the foundations of sustainable finance take root, the trajectory naturally extends towards the realm of green finance, a pivotal subset that focuses specifically on mobilizing capital for environmentally responsible projects and initiatives(Bužinskė & Stankevičienė, 2023; Martin, 2023; Tang et al., 2023). This evolution underscores a paradigm shift in the financial landscape, where considerations of sustainability and environmental impact are not only recognized but actively incorporated into the fabric of financial strategies and investments(Yu et al., 2023; J. Zhang et al., 2023; Zhu et al., 2023)this paper applies a spatial econometric model to analyze the non-linear impacts of digital finance on GTFP and its spatial spillovers. Furthermore, it utilizes mediation models to study their transmission mechanisms. The results show that digital finance first inhibits and then promotes GTFP, with spatial spillovers in four dimensions: geography, information, technology, and human capital. Its mediating mechanisms are innovation effects, structural effects, and scale effects. The statistical significance of the U-shaped relationship is regionally heterogeneous, according to different levels of human capital, informatization, urbanization, and financial marketization. Based on digital finance's U-shaped and heterogeneous impacts on GTFP, policy recommendations are to adopt differentiated

development strategies according to specific levels of digital finance and underlying conditions in smart cities. Stimulating the innovation and structural effects and suppressing the scale effects will help digital finance breakthrough inflection points, and will positively promote GTFP. It is also necessary to encourage inter-regional cooperation among smart cities to fully release spatial spillover dividends through technology sharing, information transfer, and talent exchange to promote the linked improvement of GTFP.","container-title":"Sustainability","DOI":"10.3390/su15129260","ISSN":"2071-1050","issue":"12","journalAbbreviation":"Sustainability","language":"en","page":"9260","source":"DOI.org (Crossref. In this narrative, we delve into the progression from sustainable finance to green finance, exploring the catalysts, principles, and implications that define this journey of financial transformation(Y. Zhang, 2023).

The primary objective of this paper is to conduct a literature review that explores the potential impact of sustainable finance. The primary aim of this review is to pinpoint any gaps in the available data related to sustainable finance. The article will tackle the following research inquiries:

(a) What are the patterns in the quantity of publications pertaining to this research domain?

(b) Which entities, countries, subject areas, publications, and authors are at the forefront of the current research domain?

(c) What are the primary research directions currently being pursued in this domain?

(d) The study has identified trends in past and ongoing research subjects and drawn attention to emerging areas of interest.

The paper's organization is as follows: after the introduction, the second section provides a step-by-step description of the process used for conducting bibliometric analysis. The third section details the systematic literature review (SLR) methodology, including the configuration of keyword search filters and the analysis of performance and extensive mapping. Next, in the fourth section, we explore the search results and present the network analysis conducted with VOS Viewer. This section also sheds light on the countries, keywords, and methodologies featured in the chosen articles.

Research Methodology

This research offers an overview of global research in the field of sustainable finance spanning the last 30 years. The research data was retrieved from the Scopus database using document search services in July 2023. The study utilized bibliometric techniques and conducted data analysis and visualization using Scopus' 'analyze search results' feature and the VOS Viewer application (Perianes-Rodriguez et al., 2016).

Data collection was upto 2023, to provide a comprehensive view of the study's status for the entire year from January to December. The question directive used for data mining in Scopus was "(TITLE-ABS-KEY ("finance" and "sustainable" or "sustainability") AND SUBAREA ("Social science"; "business, management and accounting"; "economics, econometrics and finance") AND DOCTYPE (article) AND LANGUAGE (English))."

For analysis of co-authorship, the study utilized authors as analytical units and applied the full counting method to obtain the author's collaboration network using VOS Viewer. Similarly, for the analysis of co-occurrence, keywords were used, and the full calculation method was employed with VOS Viewer to generate the network of keywords (Van Eck & Waltman, 2010).

Once the manuscripts meeting the inclusion criteria were chosen, they were exported in CSV format. Afterward, the data underwent conversion for use in both the VOS Viewer software and an R package data frame. This conversion process was facilitated by the open-source R package BIBLIOSHINY to guarantee the precision and accuracy of the results.

Results and Discussion

The main findings of the collected data from the Scopus database from year 1993 to 2023 are shown in Table 1.

Table 1

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	1993:2023
Sources (Journals, Books, etc)	783
Documents	2306
Annual Growth Rate %	21.3
Document Average Age	3.74
Average citations per doc	14.49
References	127063
DOCUMENT CONTENTS	
Keywords Plus (ID)	4181
Author's Keywords (DE)	6808
AUTHORS	

Authors	6138
Authors of single-authored docs	393
AUTHORS COLLABORATION	
Single-authored docs	415
Co-Authors per Doc	3.06
International co-authorships %	29.62
DOCUMENT TYPES	
Article	2138
Conference Paper	46
Review	122
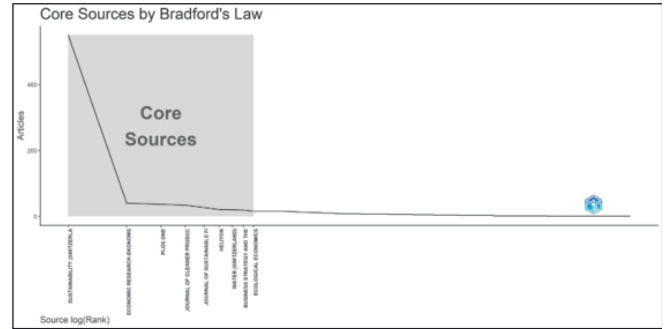
Table 1 provides a concise Summary of the yearly research production related to the subject. The publications exhibited an annual percentage growth rate of 21.3%. Notably, in 2022, there was a significant spike in paper publications across various journals, marking the most notable summit in the data. This pattern indicates that since 2012, the annual count of paper publications has been steadily and substantially increasing.

For a more detailed analysis of the contributions from authors worldwide, please refer to Figure 2 below. The figure illustrates that from 1993 to 2023, scholars have shown increasing attention to the subject, resulting in a steady rise in article output, reaching 328 articles in 2023. This trend signifies a growing interest among researchers in the field, with annual manuscript contributions showing encouraging results on a global scale.
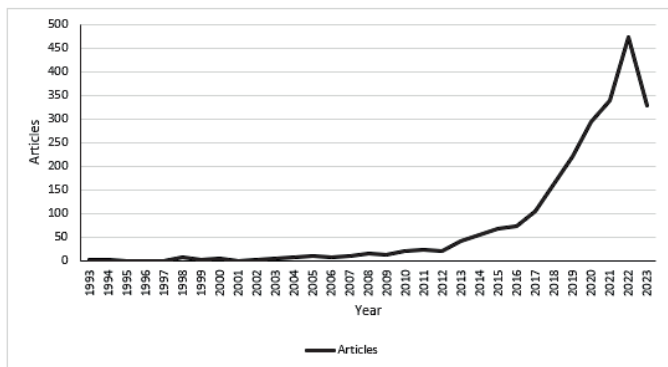
Figure 1

Bradford's Law of Scattering outlines three distinct zones, which follow a geometric series pattern represented as 1:n:n2. The divisions of the nucleus are summarized in figure 2.

Table 2 above presents the ranking of the top 9 journals along with their corresponding frequencies and cumulative frequencies, all of which are categorized under Zone 1.

Figure 2

SO	Rank	Freq	cumFreq	Zone
SUSTAINABILITY (SWITZERLAND)	1	551	551	Zone 1
ECONOMIC RESEARCH-EKONOMSKA ISTRAZIVANJA	2	40	591	Zone 1
PLOS ONE	3	37	628	Zone 1
JOURNAL OF CLEANER PRODUCTION	4	34	662	Zone 1
JOURNAL OF SUSTAINABLE FINANCE AND INVESTMENT	5	27	689	Zone 1
HELIYON	6	21	710	Zone 1
WATER (SWITZERLAND)	7	20	730	Zone 1
BUSINESS STRATEGY AND THE ENVIRONMENT	8	19	749	Zone 1
ECOLOGICAL ECONOMICS	9	16	765	Zone 1

Figure 3 depicts the document examination published per year based on source type. Notably, the "Sustainability"," Journal of Cleaner Production"," Plos One", and Journal of sustainable finance and investment" stand out as eminent journals in the field of Sustainable Finance.

Figure 4 illustrates the count of publications by authors who have received an "h-index", where some authors have achieved an h-index or more citations, whereas other publications have not exceeded h citations each. The h-index is a defined as a measure of an individual scientist's impact rather than that of a journal.

Figure 5 presents a country-wise distribution of the paper's publications. The United States (USA) tops the

list with the largest number of publications by authors, totaling 4,468. Coming in a close second, authors from the United Kingdom have contributed 4,269 articles, while Indian researchers have published 332 articles.
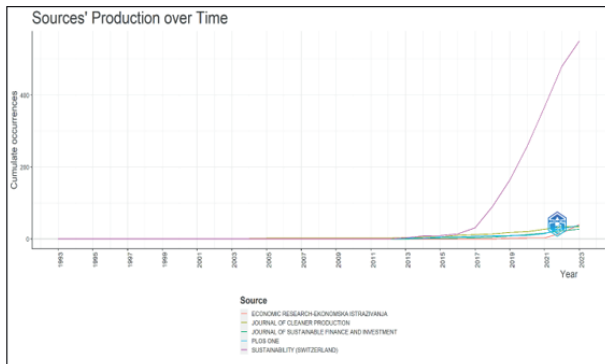
Figure 3
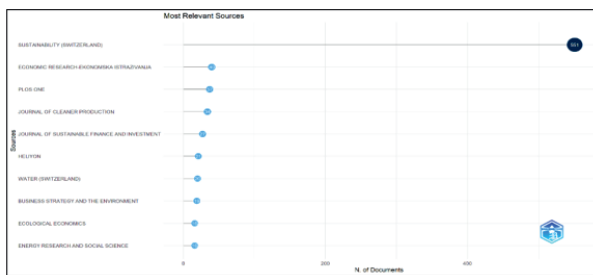
Figure 4
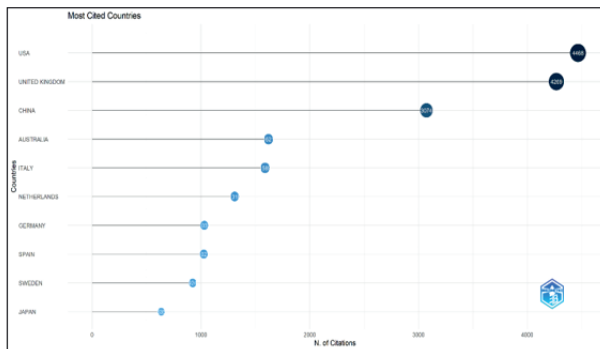
Figure 5
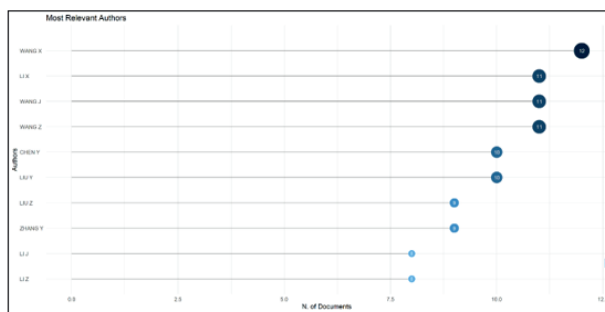
Figure 6

Author's Impact

Figure 6 displays the authors with the highest global citations, with Wang X. ranking first, followed by Li X. Wang J. Table 2 provides a list of authors along with the fractional values of their published articles.

Table 2

Authors	Articles	Articles Fractionalized
WANG X	12	3.06
LI X	11	4.12
WANG J	11	2.27
WANG Z	11	2.85
CHEN Y	10	3.28
LIU Y	10	2.58
LIU Z	9	3.09
ZHANG Y	9	2.70
LI J	8	1.91
LI Z	8	3.25

Social-Structure: Collaborative Analysis

The collaborative examination provides Exact understanding of how authors from different countries engage in knowledge exchange within a specific domain of research. Figure 7 displays a network depicting author collaboration, where co-authors are organized into clusters to visualize the landscape. To be included in the network, a country must have a minimum of 5 documents, resulting in 76 out of 168 countries meeting this criterion.

In Figure 7, each author must be associated with a minimum of 2 documents, and the document with the highest number of authors comprises a total of 5 contributors. This representation assumes that every author possesses at least two citations. This visual aid assists in identifying clusters of research scholars and noteworthy authors. The network diagram employs linkages, fonts, and color sizes to depict strong relationships between authors and countries.

Co-authorship analysis involves the collaboration of two authors, regardless of whether they come from different countries or the same one, in producing a paper. This analysis employs VOSviewer software for group mapping. Figure 7 showcases a global illustration of authors collaborating on a specific topic.

From the dataset, out of the 168 countries participating in collaborative research on sustainable finance through co-authorship, a minimum of 3 articles per country were taken into account. Consequently, a threshold of

76 countries was established. The figure highlights the countries with the highest cumulative link strength. The normalization technique used is modularity.

A co-author network can be conceptualized as a graph where authors are nodes, and edges connect two authors if they have jointly authored a paper. The co-authorship connection isn't solely based on the number of documents co-authored but also on the total number of authors for each co-authored article.

In the context of fractional counting, when an author collaborates on a document with n other authors, each of the n co-authorship links is given a weight of 1/n. In Figure 8, out of a total of 2,270 authors, the maximum number of authors per document is limited to 5. To set a criterion, authors were expected to have a minimum of 2 papers and 2 citations. Fractionalization normalization was employed in the analysis. Co-authors published in 2022 are depicted in yellow, those from 2014 in purple, and co-authors from other years are shown in varying colors.
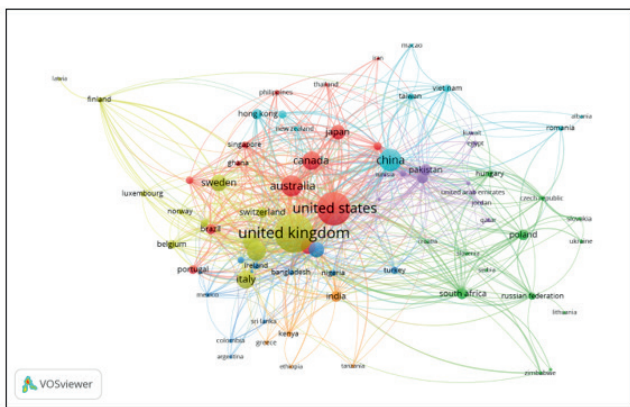
Figure 7
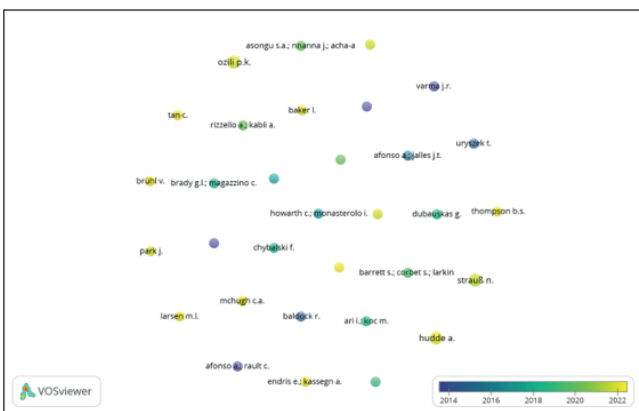
Figure 8

Renowned Authors Output Overtime

The following visualization illustrates how renowned authors have evolved over time. The size of each bubble represents the number of papers they have authored. Within each bubble, you can see the cumulative total of citations and the number of publications for that specific year. The author's timeline is portrayed through the connecting line.

Figure 9 portrays the author's output concerning the quantity of publications across time. The size of the bubbles above each point on the timeline is proportionate to the number of papers published in that specific year. Furthermore, the intensity of color in the bubbles correlates with the total citations received per year (for more details, refer to Table 3).

Figure 10 exhibits the diagram of Lotka's Law, which unveils the productivity of authors within a defined timeframe, aiming to assess the extent of authors' productivity. In this diagram, "X" signifies the overall number of contributions, "Y" represents the count of authors, and "C" denotes a constant. The equation of Lotka's law, $X^n = C$, is employed with the value of n being 2.

Table 4 offers a summary of the top ten countries with the most citations credited to their authors. Based on this information, it becomes evident that authors from the United States make a substantial contribution to various articles, amassing a total of 4,468 citations.
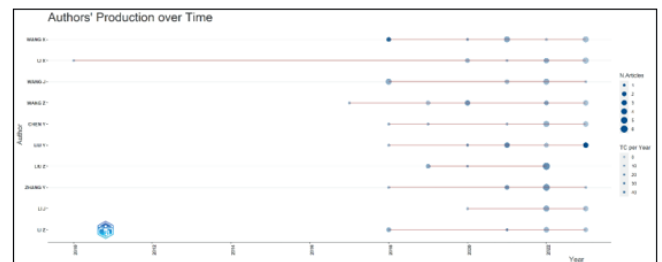
Figure 8

Table 3

Documents written	N. of Authors	Proportion of Authors
1	5558	0.906
2	415	0.068
3	95	0.015
4	33	0.005
5	11	0.002
6	11	0.002

7	4	0.001
8	3	0
9	2	0
10	2	0
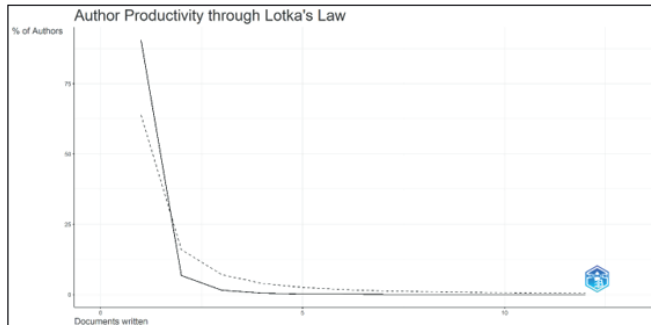
Figure 9

Table 4

Country	TC	Average Article Citations
USA	4468	37.50
United Kingdom	4269	18.90
China	3074	11.00
Australia	1621	28.40
Italy	1589	17.10
Netherlands	1310	24.70
Germany	1032	12.60
Spain	1027	11.00
Sweden	924	25.00
Japan	635	33.40

Conceptual Structure

The conceptual framework entails a repository of bibliographic records, creating a meticulously structured digital compilation encompassing published scientific literature, such as journal papers, conference reports, patents, and books.

Figure 11 exhibits the bibliographic linkage between countries within this repository. It visually represents the interconnections and associations among the included journal articles, conference proceedings, patents, and books.
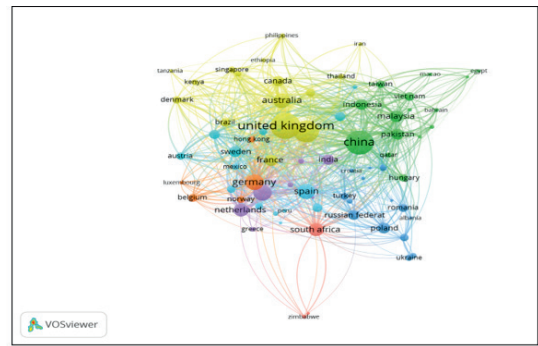
Figure 10

The networks expose the connections between keywords and the concepts and subjects discussed in the documents. Each node in these networks symbolizes a distinct keyword. Consequently, the interconnections become more apparent, and the links between different components acquire heightened importance.

This method of analysis aids in achieving a more lucid comprehension of the scholarly goals of the research, assists in detecting significant gaps or discoveries, and offers valuable direction for subsequent investigations.

Co-Citation Analysis

In the field of bibliometrics, co-citation is a measure used to assess the similarity or relatedness of two authors or documents based on their co-cited references. When two authors (or documents) are frequently cited together by other works, it suggests a strong association or connection between their research contributions.

In the context of bibliometrix, which is a package in the R programming language for bibliometric analysis, co-citation analysis focuses on analyzing patterns of co-citations among authors. The co-citation network is constructed by considering all the references cited in a collection of scholarly documents (such as journal articles or conference papers). Figure 13 shows the co-citation analysis of authors with parameters of minimum 2 citations.
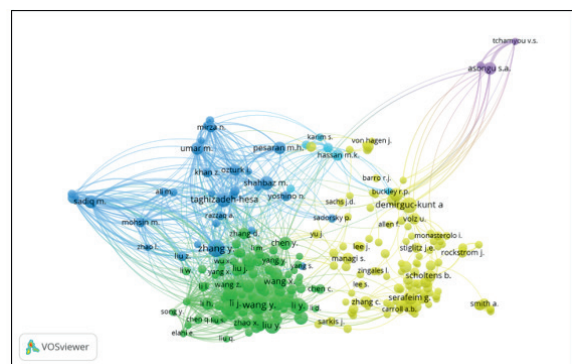
Figure 13

In Figure 14, we can observe a compilation of the most relevant authors from various countries who have contributed to the subject domain. This encompasses articles published in both publications limited to a single country and those involving multiple countries. Notably, China, the United Kingdom, and the USA emerge as the foremost countries with the most articles produced on this topic.

Upon scrutinizing the visual depiction, it becomes clear that the rate of productivity growth for publications originating from single-country publications surpasses that of publications involving multiple countries, as outlined in Table 5.
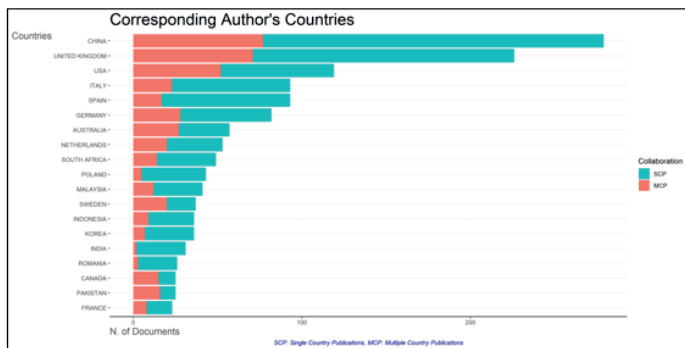
Figure 14

Table 5

Country	Articles	SCP	MCP	Freq	MCP_Ratio
	441	349	92	0.191	0.209
CHINA	279	202	77	0.121	0.276
UNITED KINGDOM	226	155	71	0.098	0.314
USA	119	67	52	0.052	0.437
ITALY	93	70	23	0.04	0.247
SPAIN	93	76	17	0.04	0.183
GERMANY	82	54	28	0.036	0.341
AUSTRALIA	57	30	27	0.025	0.474
NETHERLANDS	53	33	20	0.023	0.377
SOUTH AFRICA	49	35	14	0.021	0.286

Co-word Analysis

Co-word analysis is depicted through the co-occurrence of researchers' keywords in Figure 15. This network analysis establishes relationships among keywords discovered in published articles, offering insights into the conceptual framework of connections between various ideas. Figure 15 illustrates the simultaneous appearance of particular keywords within research papers, a technique known as co-word analysis. This approach utilizes text-based information from the publications to explore historical, current, and potential associations between themes within a research domain. It's important to emphasize that the chosen keywords are generated from titles using software tools, not the authors' own language.

The diagram depicted in Figure 15 unveils two primary clusters, represented by distinct colors, which emphasize the patterns of co-occurrence from the pool of 768 analyzed articles. Researchers can extract valuable insights from this analysis to further enrich their papers for more comprehensive investigations. The analysis includes a total of 284 words, grouped into 13 clusters, and normalized using the association strength method.

Based on the information presented in the diagram, we can observe that the keyword "Sustainable Finance" is frequently associated with "sustainability" and "climate finance," indicating their strong linkages. On the other hand, less attention has been given to topics like "corporate social responsibility," "sustainable development goals," and the "social finance." Scholars may find it fruitful to conduct empirical studies on these lesser-explored subjects.
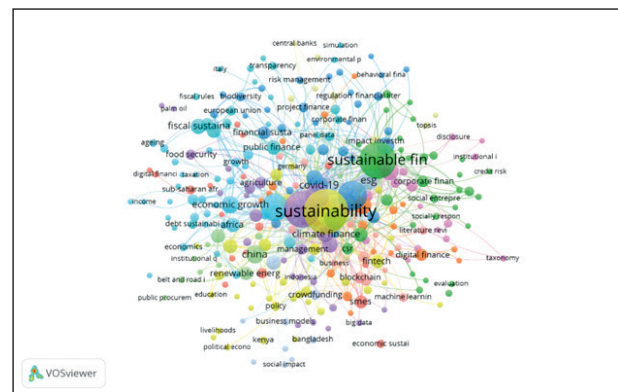
Figure 15

Trend Topic

The contents labeled as "Emerging Themes" are presented in Table 6, illustrating the frequency of authors' utilization of keywords and emphasizing a transient surge in popularity when compared to a prior investigation.

By referring to Table 6, we can discern the keywords most frequently employed within the social network during the specified timeframe. It provides insights into the topics that authors discussed in their work for that year. In years 2020-2022, the hot topics included green finance, sustainable development, climate change, economic development, and sustainability.

In Figure 16, the bubbles below represent the annual frequency of keyword usage in the articles within the given timeframe. This visualization helps to grasp how frequently specific keywords were utilized over the years.
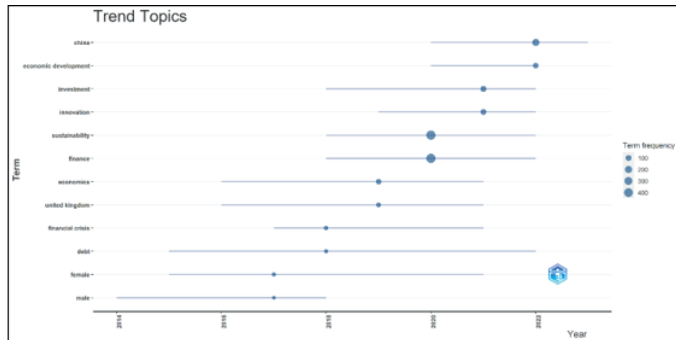
Figure 16

Table 6

Items	Frequency
Sustainable finance	178
Green finance	109
Sustainable development	171
Climate change	77
Sustainability	255
Finance	99
Financial sustainability	21
Governance	27
Fiscal sustainability	31
Poverty	16
Microfinance	14
Fiscal policy	25
Debt	11

Discussion and Findings

This research offers a global overview of studies conducted in the realm of sustainable finance spanning the last thirty years. Data for this study was obtained from the Scopus database through document search services in July 2023. Utilizing bibliometric techniques, we conducted data analysis and visualization using the 'analyze search results' feature within Scopus and the VOS Viewer application.

The data collection encompasses the entirety of 2023, providing a comprehensive overview for the entire year from January to December. The query command for data extraction from Scopus was structured as (TITLE-ABS-KEY ("finance" and "sustainable" or "sustainability") AND SUBAREA ("Social science"; "business, management and accounting"; "economics, econometrics and finance") AND DOCTYPE (article) AND LANGUAGE (English)). For the co-authorship analysis, authors were treated as the primary units of analysis, and the author collaboration network was constructed using VOS Viewer. Likewise, co-occurrence analysis involved keywords, and a keyword network was generated using VOS Viewer. Once the pertinent manuscripts that met the inclusion criteria were identified, they were exported in CSV format. Subsequently, the data was converted into formats compatible with both VOS Viewer software and an R package data frame. This conversion process was executed using the open-source R package BIBLIOSHINY to ensure the accuracy of the results. Table 1 offers a succinct summary of the annual research output in the field. The data showcases an annual growth rate of 21.3%. Notably, 2022 saw a significant surge in paper publications across diverse journals, marking a prominent peak in the dataset. This trend underscores the consistent and substantial growth in annual paper contributions since 2012. To gain a more comprehensive view of authors' global contributions, refer to Figure 2. The figure visually depicts the increasing attention paid by scholars to the subject, leading to a steady rise in article output, reaching 328 articles in 2023. This upward trajectory signifies growing interest among researchers on a global scale.

Bradford's Law of Scattering defines three distinct zones, which follow a geometric series pattern represented as 1:n:n2. The divisions of the nucleus are summarized in Figure 2. Table 2 presents the ranking of the top nine journals along with their corresponding frequencies and cumulative frequencies, all falling under Zone 1. Figure 3 visually represents the distribution of publications by document type over the years. Notably, journals such as Sustainability, Journal of Cleaner Production, Plos One, and Journal of Sustainable Finance and Investment emerge as prominent sources in the field of Sustainable Finance.

Figure 4 offers insight into the frequency of publications by authors who have received an h-index. Some authors have achieved an h-index or more citations, while other publications have not exceeded h citations each. The h-index, reflecting an individual scientist's impact rather than that of a journal, informs this analysis. Country-wise distribution of paper publications is depicted in Figure 5. The United States leads the list with the highest number of author contributions (n = 4468). The United Kingdom closely follows with authors contributing (n = 4269) articles, while Indian researchers have published (n = 332) articles. Figure 6 reveals the most cited authors on

a global scale. Wang X. holds the top position, followed by Li X and Wang J. These authors have played a pivotal role in shaping the discourse within the field.

Figure 7 delves into collaborative analysis, offering insights into how authors from different countries engage in knowledge exchange within the field. A network illustrates author collaboration, where co-authors are clustered to visualize the landscape. To be part of the network, a country must have a minimum of 5 documents, resulting in 76 out of 168 countries meeting this criterion. In Figure 7, it is stipulated that authors must have a minimum of 2 documents, and each document can have a maximum of 5 authors. This assumption is based on the idea that each author is associated with at least two citations. This visual representation assists in pinpointing groups of research scholars and notable authors, where connections, fonts, and the sizes of colored elements in the network diagram signify robust associations between authors and countries. The paper's primary aim is to conduct a comprehensive literature review to explore the potential impact of sustainable finance. To address this, the research questions are formulated: a) What is the trajectory of publications in this research field? b) Which countries, organizations, publications, subject areas, and authors are dominant in this field? c) What are the primary research directions in this domain? d) What trends can be observed in past and present research topics, and what emerging areas are gaining traction?

To achieve these objectives, a rigorous methodology was employed, utilizing bibliometric analysis, systematic literature review, and comprehensive mapping analysis. The results offer a nuanced understanding of the field's development, trends, and areas of interest. The study's significance lies in its capacity to guide future research, address existing gaps, and inform scholars, policymakers, and stakeholders about the evolving landscape of sustainable finance. The analysis of author collaborations, co-citations, and co-occurrence of keywords enriches the understanding of the network of ideas, researchers, and concepts shaping the field. This comprehensive review contributes to the broader goal of advancing sustainable finance as a driving force toward a more sustainable future.

Conclusion

For 29 years, this study has been examining and presenting the global scientific contributions related to sustainable finance over nations. The primary goal has been to conduct a comprehensive assessment of the existing research in the literature. However, it's important to acknowledge certain limitations in this study. Firstly, all the included articles are primarily in English and originate from developed countries. Secondly, the study's timeframe spans from 1993 to 2022, excluding more recent articles from 2023. The study's data is sourced exclusively from "SCOPUS," neglecting other reputable journal databases like WOS, Google Scholar, and Elsevier. A more comprehensive analysis across various sources could potentially yield more robust outcomes.

The research highlights that researchers from the China, United Kingdom, USA and Italy and have garnered substantial attention within this domain. The study's findings can benefit both novice and established researchers by guiding them toward new research focal points, pertinent sources, and collaboration prospects, facilitating well-informed decisions. Through an exploratory bibliometric analysis, this study delved into publications concerning sustainable finance. In 2021 and 2022, topics of "sustainability" and "climate finance" were discussed, though most articles were not extensively explored to maintain the review's length, which stands as a limitation.

The study also unveiled a correlation between international scientific partnerships and the efficacy of sustainable finance research. Collaborative research with other countries exhibited greater citation impact compared to individual scientific output. This insight informs prospective researchers about emerging themes, contexts, and collaborative opportunities in these domains. The study sheds light on prevalent issues within the field, guiding the way toward potential research areas. As a result, this research holds valuable insights for the formulation of financial education and literacy policies.

Future Scope and Limitation

1. **Energize the Green Bonds Market:** Pioneering the expansion of the green bonds market is paramount. These bonds serve as a vital tool for financially underpinning eco-friendly development. They effectively tackle the notable requirements for funding green and low-carbon projects driven by the ongoing shifts in the tangible economy. Subsequent investigations into green bonds should thoroughly explore the complex interrelationships between green bonds and interconnected markets like the financial sector, carbon market, renewable energy market, and environmentally-focused stock market. Furthermore, it's imperative to gauge the interrelationship between the green bond market and macroeconomic stability across diverse countries, scrutinizing this correlation through both temporal and frequency dimensions. Scholars seeking guidance on measuring this relationship can

glean insights from the pertinent research conducted by (Boukhatem et al., 2021).

2. **Promote ESG Green Finance with Vigor:** The vigorous propagation of ESG (Environmental, Social, and Governance) green finance is of paramount importance. Subsequent research regarding ESG investment funds must deeply explore the intricate interplay between SRI (Socially Responsible Investment) funds and ESG ratings. This exploration should center on multifaceted aspects such as assessing ESG risks, enhancing ESG information disclosure practices, refining methodologies for ESG evaluation and rating, establishing criteria for evaluating ESG funds, and understanding the preferences of ESG investors. Simultaneously, just as the efficacy of international harmonization in corporate social responsibility information remains a subject of scrutiny, future ESG information disclosure efforts should strive to address the effectiveness of international harmonization.

3. **Foster Green Finance at the Corporate Level:** A decisive effort should be made to drive the evolution of green finance at the corporate level. Green finance acts as a conduit for channeling social capital into eco-friendly projects through avenues like loans, bonds, investments, and stock issuance. These ecologically conscious endeavors are increasingly being initiated and executed by specific companies. While green innovation offers the opportunity to improve resource efficiency, strengthen a company's reputation, and boost financial results, it's important to recognize that a company's commitment to sustainability and environmental decisions is greatly shaped by its corporate governance structures. Therefore, researchers are encouraged to delve deeper into uncovering the complex ways in which corporate governance influences the direction of green finance. Additionally, gaining insights into the responsibilities and strategies employed by financial institutions operating within corporate conglomerates to promote green finance represents a promising avenue for further investigation.

4. **Foundation for a "Green Recovery" Strategy through Green Finance:** In the aftermath of the COVID-19 pandemic, nations worldwide are confronted not only with the economic downturn instigated by the crisis but also with the pressing imperative of transitioning toward a low-carbon trajectory. While governments have responded with economic stimulus packages to counteract the socio-economic repercussions of the pandemic, these initiatives have often exhibited a misalignment with

environmental concerns. The "Greenness of Stimulus Index," a research project carried out by think tanks Vivid Economics and Finance for Biodiversity, highlights that just 12% of the COVID-19 stimulus plans in the world's top 30 economies were focused on reducing greenhouse gas emissions or supporting nature and biodiversity. Conversely, nearly 33% of these funds were directed toward industries with high carbon emissions. It's worth noting that Europe and the EU have shown their commitment to a sustainable post-COVID-19 recovery by allocating 25% of their EUR 750 billion recovery package to initiatives like energy-efficient infrastructure and investments in renewable and clean technologies. However, the escalation of the Russian-Ukrainian conflict, combined with rising inflation, has raised concerns about the global economic outlook and could potentially hinder the green recovery efforts of nations worldwide, particularly the European Union's ambitious green recovery goals.

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Prevalence of Drug Abuse Amongst The Youth of Jalandhar, Punjab: A Comprehensive Study

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Abstract

Drug abuse and misuse has assumed a magnificent form in the contemporary times, particularly effecting young people with detrimental effects on individual and the society. The principal objectives of this study are (i) To examine how widespread drug abuse is among the youth in Jalandhar district, Punjab; (ii) To determine the nature and extent of drug usage and (iii)To assess the effects of drug addiction on the physical and mental well-being of the individuals involved. To conduct this study, 500 random individuals from Jalandhar district, Punjab were surveyed. The study unveiled a deep connection between drug abuse, employment, and education level with poly-drug abuse and age-of-initiation. In the end, a list of possible suggestions has been included which can address this dangerous state of events relating young people.

Keywords: *Drug abuse, Education, Poly-drug abuse, Youth, Human resource*

Introduction

Meaning and Definition

The worldwide prevalence of drug misuse is a major problem today. Each year, smoking, alcohol, and drug usage claim the lives of millions of people. The economy and human resources are both harmed. Anyone can fall prey to drug addiction at any time in their lives if they are negligent, regardless of their age. Researchers have found that many young people take substances such Gutka, Tobacco, Pauches, cough syrups, proseywon, dormant 10, discephan pills, corex phenydryle, and cough syrups containing codine sulphate.

If ingested by a living body, any substance will alter some aspect of its functioning, as stated by the World Health Organization. The drug is used to alter or sustain an emotional state, and it may have negative effects on the user as well as on society. When someone develops an addiction to drugs or alcohol, their body no longer functions normally without those substances. For example, an addict's mental and behavioral state may change to the point that he or she poses a danger to themselves or others when under the influence of an addictive substance. Addiction makes it difficult for a person to abstain from drug use.

Nature and Impact of Drug Abuse

Substance abuse, or drug abuse, is the chronic and harmful use of drugs. When it comes to drugs, the line between abuse and addiction is extremely thin. When someone is abusing drugs, they may or may not get addicted to them. In contrast, a drug addict is completely dependent on their drug of choice. As a result, drug abuse frequently results in drug dependence. Substance misuse can be seen as both an abnormal activity and a major societal issue. It can be understood in two ways: first, as a symptom of an individual's social discord; second, as a systemic problem with negative effects on society at large. While drug abuse has been recognized as a major social issue in the West for quite some time, it has only been in the last three decades that this is the case in India.

In addition to being a major drug transit hub (from which narcotics are trafficked from some nations and sent to others), India's drug use prevalence is reportedly on the rise. An estimated one million people in India are heroin addicts. It is believed that between Rs 10,000,000,000 and Rs 20,000,000,000 is made annually from the illegal drug trade in India. Similarly, the amount of illegal narcotics confiscated has grown dramatically over time. Addiction to illegal substances is on the rise among kids from all socio-economic backgrounds, not just the poor.

Effects of Drug Abuse and Their Causes

Stimulants, inhalants, cannabinoids, depressants, opioids and morphine derivatives, anabolic steroids, hallucinogens, and prescription medicines are the eight main types of drugs that can be abused. Stimulants rev up the neurological system and give you a burst of extra pep in your step. 'Uppers' is another name for them because of how alert they make you feel. In contrast to depressants, stimulants are known to increase activity. When the stimulant's effects wear off, the user is often left feeling ill and exhausted. Consistent use of these substances can have devastating consequences for the user.

Drug Abuse Amongst Youth

The origins of drug misuse are a topic of much speculation. They have various causes, including genetics and individual traits. Problems with discipline, motivation, dissatisfaction, dissatisfaction, anxiety, boredom, and socialization often accompany substance addiction in young people. These features are indicative, but not definitive. Adolescents who abuse drugs or alcohol are as diverse as the substances themselves.

Most youngsters experiment with drugs and alcohol. If the child is just exploring, this activity will occur rarely or only a few times before the youngster stops trying new drugs altogether, which is the first step in the four-stage progression to addiction. Followed by abstinence, this is the most common stage of adolescent substance abuse before the youngster progresses to regular usage. Dependence is the last and last phase. Teenage drug and alcohol misuse can have its roots in a child's natural propensity to defy authority. Some influencing factors can be:

- Teens with low self-esteem generally struggle with low self-confidence and insecurity. Some drug and alcohol use could have this as its foundation.

- Teenagers who experience social difficulties with their age peers or the opposite sex may find that drugs or alcohol help them relax and open out to their peers.

- Some teens self-medicate with booze and drugs. Depression, pessimism, and unhappiness are at the heart of their emotional struggles. These medications appear to be helpful in reducing symptoms.

- Some of these young people partake because they love the euphoric effects of intoxicants and drug use.

Substance misuse is a learned trait that can be picked up through three different types of social interaction: persuasion, unconscious imitation, and reflective thought. In a survey asking where people obtained drugs, the most common responses were (i) friends, acquaintances, family members, and the home cupboard; (ii) doctors and hospitals were used more frequently by girls than boys; and (iii) friends were the most frequently mentioned non-medical source.

Literature Review

Palmer (2014) identified various factors associated with drug abuse among adolescents, including divorce, absent parents, absent father, low family cohesion, lack of closeness within the family, and communication issues. According to Fagan (1989), drug-abusing adolescents perceive their parents as having less control over the family. Johnson and Pandina (1991) conducted a three-year study involving 1,380 adolescents and found that the quality of child-parent interactions, rather than parental alcohol use, was linked to the adolescents' drug use, delinquency, and reliance on emotionally focused coping strategies.

Gilbert (2014) presented an alternative perspective on human maturity, stating that individuals differ in their ability to adapt and effectively deal with life's challenges and achieve their goals. The level of basic self is influenced by a person's capacity to separate their emotions from their primary relationships while maintaining emotional

connections with important individuals in their life. However, there is a contradiction in these ideas: individuals with a solid sense of self and life direction are more capable of engaging in meaningful and open communication within relationships, whereas those excessively fused with others may struggle to maintain healthy adult attachments. The need for attachment drives enmeshment in relationships.

Anderson and Sabatelli (2014) expanded on the concepts of differentiation and individuation, often used interchangeably. Individuation refers to the developmental process of separating oneself from identification and dependence on others, which holds particular significance during infancy and adolescence. Differentiation, on the other hand, is distinct from Bowen's notion of differentiation and pertains to the level of fusion or emotional neediness within a family system. Higher levels of differentiation reduce the constant search for love, approval, or affection within a family, decrease the tendency to blame others for unmet needs, and enable family members to engage in adaptive, age-appropriate, goal-directed behaviors.

Well-differentiated family systems allow for age-appropriate individuation, enabling young adults to experience both intimate connections and independent functioning. In contrast, poorly differentiated family systems exhibit dependence or disengagement among family members, leading to age-inappropriate individuation, where children lack clear identity, boundaries, and the ability to set life directions. As these children grow into adults, they either remain fused with others, including their parents, or attempt to separate by disconnecting from significant relationships.

Tobler and Stratton (2014) conducted a meta-analysis of school-based prevention programs and found that interactive programs (e.g., social influences and skills programs) had greater effects compared to non-interactive programs (e.g., knowledge-based programs). Interactive programs were particularly effective with illicit drugs other than cannabis but equally successful in addressing cigarette, cannabis, and alcohol use.

In a review of drug prevention programs in schools, Cuijpers (2014) identified key components that contribute to program effectiveness. These included proven effects, interactive delivery methods, interventions based on the "Social Influence Model," focus on norms, commitment to not using drugs, and intentions to avoid drug use. Additionally, community interventions and the inclusion of life skills within programs were found to enhance their impact.

According to Tobler et al. (2015), there is strong evidence indicating that interactive methods (e.g., role play) for delivering drug prevention interventions are more effective than non-interactive methods (e.g., lectures) in reducing drug use. Interactive approaches provide students with opportunities to communicate, receive feedback, receive constructive criticism, and practice refusal skills with peers.

The issue of drug addiction, particularly heroin addiction, among the young generation in the union territory of Jammu and Kashmir has become increasingly problematic. Drug trafficking and the illegal cultivation of opium within the region have had a significant impact on the youth. Given its geographical location, Jammu and Kashmir is highly vulnerable to the illegal routing of drugs, particularly heroin, from Pakistan. Considering this, the present study by Esther (2022) aims to examine the socio-demographic profile of substance abusers attending the Lifeline Rehab drug de-addiction center in Kathua district, Jammu. By understanding the socio-demographic characteristics and commonly consumed substances among the youth, this research seeks to shed light on the prevailing patterns of drug abuse in the region, which can inform targeted interventions and policy measures to address this pressing issue.

Objectives of The Study

- To examine how widespread drug abuse is among the youth in Jalandhar district, Punjab.

- To determine the nature and extent of drug usage and identify the sources through which drugs are supplied.

- To investigate the socio-economic backgrounds of individuals who abuse substances by means of case studies.

- To assess the effects of drug addiction on the physical and mental well-being of the individuals involved, also involving chi-squares methodology.

Methodology

The study employed a mixed-method approach, utilizing both qualitative and quantitative methods. The research design involved a survey questionnaire and semi-structured interviews with the citizens of Jalandhar, Punjab on the menace of drug abuse. The survey questionnaire was distributed among 500 randomly selected citizens of Jalandhar, Punjab. The participants were assured of the confidentiality of their responses, and their consent was obtained before the data collection. Additionally, in-depth interviews and focus group discussions were conducted with key stakeholders, such as government officials and citizens, to understand the deeper reasons, impact, and significance of the issue in

the contemporary times. Name of the study, authors, location, year, sample size, type of problem addressed, techniques utilized, findings, and suggestions were among the columns in Excel. Case Studies and Chi-square methodology has been used.

Data Interpretation & Analysis

Figure 1 displays the overall distribution of respondents categorized by age groups. Most respondents fall below the age of 30. The smallest proportion (6%) belongs to the age group of 16-19 years. It is worth noting that even teenagers are not only aware of drugs but also have developed a habit of consuming drugs to such an extent that they require hospitalization for treatment. Equally significant, if not more, is the fact that approximately 60% of the respondents belong to the crucial period of their lifespan (25-29 years) when they are expected to be highly productive, energetic, and open to change. Unfortunately, this creative period is completely ruined due to the harmful consequences of drug use. As a result, our country is deprived of the potential contributions from this important demographic.

Fig. 1- Frequency and Percentage Distribution of Respondents according to Age Group
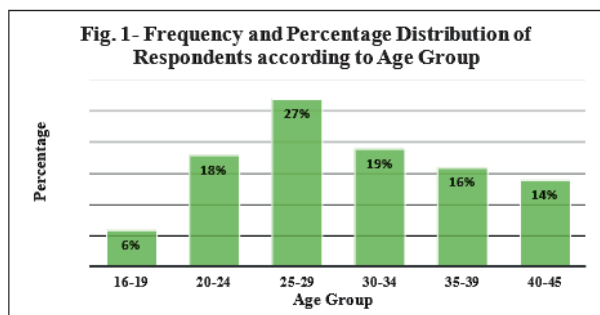
Table 1 illustrates that among the respondents, 26% are illiterate, while the highest proportion (32%) has a primary level of education. The observed fluctuation in the frequency distribution of respondents based on their education level indicates a consistent relationship between drug addiction and educational background. In other words, most addicted individuals tend to have lower levels of education.

Table 1   Frequency and Percentage of Distribution of Respondents according to Educational Qualification

S. No.	Educational Qualification	Frequency	Percentage
1	Illiterate	130	26%
2	Primary	160	32%
3	Matriculation	70	14%
4	H.S.C.	100	20%
5	Graduation & above	40	8%
Total		500	100%

The distribution of respondents according to their occupation (Table 2 & figure 2) reveals that the unemployed group is more susceptible to drug use compared to other groups. Among the different occupation categories, the percentages of drug users are as follows: labor class (12%), government servants (8%), business group (4%), and other groups such as private job holders and unskilled workers (14%).

Table 2   Frequency and Percentage of Distribution of Respondents according to Occupation

S.No.	Occupation	Frequency	Percentage
1	Unemployed	310	62%
2	Laborer	60	12%
3	Government Servant	40	8%
4	Business	20	4%
5	Any other	70	14%
	Total	500	100%

Fig. 2- Frequency and Percentage Distribution of Respondents According to Occupation
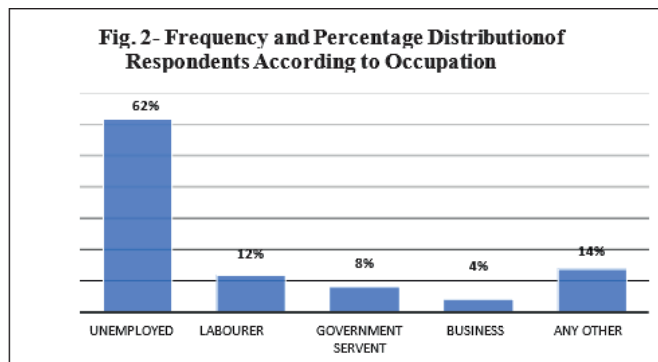
Table 3 and figure 3 provide information on the income levels of the respondents. It indicates that 14% of respondents belong to the lowest income group, while 38% belong to the highest income group. This suggests that a significant portion of respondents (28%) who are economically dependent are still vulnerable to falling victim to dangerous drugs. Income may play a role in combination with other factors, rather than on its own, in influencing drug use. In fact, variables such as education, occupation, and income are interconnected, and the complex interplay among them may shed some light on drug use patterns.

Table 3   Frequency and Percentage Distribution of Respondent According to Personal Monthly Income

S.No.	Personal Monthly Income	Frequency	Percentage
1	Less than Rs. 3000	190	38%
2	Rs. 3001- Rs. 6000	70	14%
3	Rs. 6001- Rs. 8000	100	20%
4	Rs. 8001 and above	140	28%
Total		500	100%

Fig. 3- Frequency and Percentage Distribution of Respondent According to Personal Monthly Income

The provided table 4 and figure 4 show the overall percentage distribution of respondents based on the type of drugs they first used. Among the respondents, 42% started with heroin, 17% used charas, 9% used opium, 26% used bhang/cannabis, and 6% used other drugs initially. "Others" can include many other dangerous drugs.

Table 4   Frequency and Percentage Distribution of Respondents According to Type of Drug(s) First Used

S.No.	Name of Drug(s)	Frequency	Percentage
1	Heroin	210	42%
2	Charas	85	17%
3	Opium	45	9%
4	Bhang/Cannabis	130	26%
5	Others	30	6%
	Total	500	100%

Fig. 4- Frequency and Percentage Distribution of Respondents according to Type of Drug(s) first used

Figure 5 illustrate the age distribution of respondents when they first experimented with drugs. The highest occurrence of drug experimentation falls within the age group of 20-25 years, while individuals above the age of 35 are less likely to have experimented with drugs at an earlier stage.

The table 5 and corresponding figure 6 provides an overall percentage distribution of respondents based on the drugs they are currently using. Among the respondents, 60% are using only one drug, 22% are using two drugs, 12% are using three drugs, and 6% are using four or more drugs.

Table 5   Frequency and Distribution of Respondents According to the Number of Drug(s) Being Used

S. No.	How many drug(s) do you use at present?	Frequency	Percentage
1	Only 1	300	60%
2	Two	110	22%
3	Three	60	12%
4	Four or more	30	6%
		500	100%

Fig. 5- Frequency and Percentage Distribution of respondents according to age at First Experimenting Drug(s)
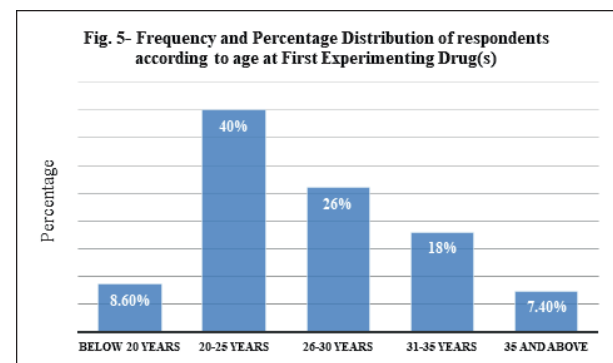
Chi-Square Analysis

Table 6   Chi-square based on Age and Drug Type

			Heroine	Charas	Opium	Bhang	Other	Total	Chi-Square
AGE	16-19	Count	1	2	4	15	8	30	79.630**
		Column N%	0.50%	2.40%	8.90%	11.50%	26.70%	6.00%	
	20-24	Count	25	20	8	30	7	90	
		Column N%	11.90%	23.50%	17.80%	23.10%	23.30%	18.00%	
	25-29	Count	75	15	13	26	6	135	
		Column N%	35.70%	17.60%	28.90%	20.00%	20%	27%	
	30-34	Count	33	23	5	29	5	95	
		Column N%	15.70%	27.10%	11.10%	22.30%	16.70%	19%	
	35-39	Count	39	12	10	19	0	80	
		Column N%	18.60%	14.10%	22.20%	14.60%	0%	16%	
	40-45	Count	37	13	5	11	4	70	
		Column N%	17.60%	15.30%	11.10%	8.50%	13.30%	14%	
	Total	Count	210	85	45	130	30	500	
		Column N%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	

*Note: **Significant at 0.01 level*

Fig. 6- Frequency and Distribution of respondents according to the number of drug(s) being used
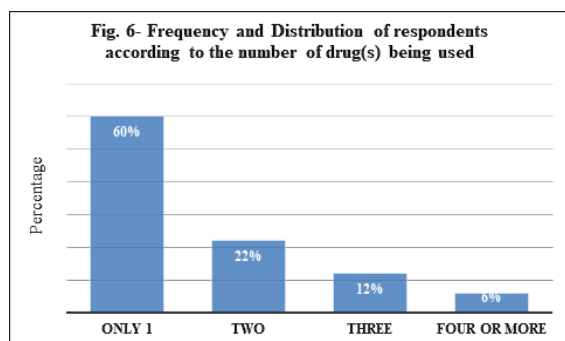
The study's findings indicate that youth considerably differ in their drug use according to their age factor and kind of addiction, as seen by their chi-square values of 79.630, which are significant at the 0.01 level. The table's results also demonstrate that most respondents, or 35.7%, who reported using heroin were between the ages of 25 and 29.

Table 7   Chi-square based on Education and Drug Type

			Heroine	Charas	Opium	Bhang	Other	Total
Education	Illiterate	Count	47	17	16	44	6	130
		Column N%	22.40%	20%	35.60%	33.80%	20%	26%
	Primary	Count	75	26	9	43	7	160
		Column N%	35.70%	30.60%	20%	33.10%	23.30%	32%
	Matriculation	Count	28	15	5	17	5	70
		Column N%	13.30%	17.60%	11.10%	13.10%	16.70%	14%
	H.S.C.	Count	40	20	10	20	10	100
		Column N%	19%	23.50%	22.20%	15.40%	33.30%	20%
	Graduation & above	Count	20	7	5	6	2	40
		Column N%	9.50%	8.20%	11.10%	4.60%	6.70%	8%
	Total	Count	210	85	45	130	30	500
		Column N%	100%	100%	100%	100%	100%	100%

Table 7.1   Chi-Square Test

Pearson Chi-Square Tests		
		VAR00009
	Chi-square	20.292
	df	16
Education	Sig.	.207ns

**Significant at 0.01 level

The study's results demonstrate that youth take drugs in considerably different ways depending on their education factor and kind of addiction or substance, as their chi-square value is 20.292, which is significant at the 0.01 level. The chart also demonstrates that most respondents, 35.7% with a primary education, use heroin in district Jalandhar, Punjab.

Table 8   Chi-square based on Income and Drug type

			Heroine	Charas	Opium	Bhang	Other	Total
Income	1	Count	90	30	18	45	7	190
		Column N%	42.90%	35%	40.00%	34.60%	23%	38%
	2	Count	25	17	10	10	8	70
		Column N%	11.90%	20.00%	22%	7.70%	26.70%	14%
	3	Count	40	23	11	25	1	100
		Column N%	19.00%	27.10%	24.40%	19.20%	3.30%	20%
	4	Count	55	15	6	50	14	140
		Column N%	26%	17.60%	13.30%	38.50%	46.70%	28%
	Total	Count	210	85	45	130	30	500
		Column N%	100%	100%	100%	100%	100%	100%

Table 8.1   Pearson Chi-Square Test

Pearson Chi-Square Tests		
		VAR00009
	Chi-square	38.389
	df	12
Education	Sig.	.000**

**Significant at 0.01 level

The study's results demonstrate that youth take drugs in considerably different ways depending on their financial element and kind of addiction or substance, as their chi-square value is 38.389, which is significant at the.01 level. The data also reveals that 42.9% of respondents with an income of $3000 or more use heroin in both urban and rural locations.

Case Studies from The Relevent Field

Case Study 1

The respondent in this case is a 22-year-old man whose parents are divorced and living separately. His father is a science graduate and works as a teacher in a government school, while his mother is a postgraduate and employed. He currently lives with his mother and is unemployed. Despite obtaining a commerce degree, he cannot continue his studies due to a lack of proper guidance. He attributes his addiction to drugs to the absence of affection, love, guidance, and boredom. Since his mother is frequently away from home due to work, he feels lonely and influenced by boredom, leading him to believe that no one loves him. He believes that drugs can change his mood and temperament and help alleviate his feelings of loneliness. He mentions that drugs are easily accessible to him, but he is uncertain about his father's reaction to his drug use. On discovering the truth, his mother was shocked and wished to take him to a de-addiction center for his recovery. Despite never feeling the need to completely give up drugs and lacking the desire to do so soon, he is compelled to undergo treatment at the recovery centers.

Case Study 2

In this case, the respondent is a 32-year-old man who willingly participates in the interview and eagerly shares his perspectives with the researcher. His parents passed away a few years ago, with his father being a small farmer and his mother a housewife. He currently holds a non-governmental job and has a two-year-old son who lives with his mother. The respondent follows the Hindu religion and has only completed his 10+2 (senior secondary) education. His father was an alcoholic who showed little interest in educating his children, often spending his earnings on alcohol consumption. The respondent experienced significant psychological distress after separating from his wife, leading him to turn to drugs as a means of escaping these feelings. Maladjustment was a major factor contributing to his divorce, with psychological abnormalities also playing a role. He initially started with ganja three years ago and later began using substances such as hashish, marijuana, heroin, brown sugar, and even cough syrup due to its lethargic effects. He consumed drugs wherever and whenever, including at home. He admits that he is unwilling to refuse drugs unless pressured by others and that his experience with drugs varies depending on his mood. Sometimes he seeks solitude, while other times he becomes talkative and seeks companionship. Although he acknowledges that his relatives consider drugs to be harmful to health, he continues to use them out of boredom and to cope with marital problems. His primary objection to drugs revolves around health concerns. Initially, he tried to quit using drugs due to negative experiences and weight loss, as drug use prevented his participation in social activities. However, he resumed using drugs when faced with boredom and psychological restlessness.

Case Study 3

In Case Study 3, the respondent is a 22-year-old student and the second of three brothers from a Hindu family. His father completed education up to the higher-secondary level. Currently, he has started his own business and earns more than RS. 5000 per month. His mother is a housewife, and his other two brothers are also students. He attended an English medium school for his schooling and is currently pursuing a B.A. degree. His plan is to study law after graduation. Initially, he wanted to study science in the degree course, but he faced disappointment and frustration when he couldn't secure his desired science subject. This situation led him to feel extremely frustrated and tense, and his parents' disapproval worsened his state. It was during this time that he turned to drugs. However, he has since stopped taking drugs and has discontinued using heroin and brown sugar. Gradually, he began using only heroin as

it provided a better experience for him. He preferred not to be alone while taking drugs and sought the security and support of his friends. Eventually, he stopped taking drugs at home out of fear of being discovered, possibly because one of his friends informed his parents. As a result, his parents took him to a recovery center. In the beginning, he took drugs at a friend's house, taking them regularly, approximately four times a week, when his parents were away for a few months. During this period, he was able to consume drugs at home. Currently, he has successfully overcome drug use through psychological treatment and the support of the recovery center. He is now performing well in his studies.

Discussion

The issue of drug addiction has emerged as a significant problem, impacting numerous individuals, including the youth who are crucial for shaping the future. The younger generation, often considered the backbone of any country, faces adverse psychological and physical effects due to the harmful nature of narcotic drugs. This detrimentally hinders the holistic development of our nation. The severity of drug abuse can be measured by the increasing number of injecting drug users, which has led to the spread of blood-borne diseases such as Hepatitis and HIV/AIDS. Over the past five years, the number of drug addicts has grown alarmingly, directly, or indirectly affecting individuals, families, and society, resulting in psychological, social, and economic repercussions.

The problem of drug abuse poses a significant threat to society, affecting various social strata. Therefore, it is crucial to comprehend the dimensions and seriousness of this problem and urgently identify the socio-economic factors underlying drug addiction. To address this issue, a serious and systematic effort is required to tackle the causes of drug abuse. In this regard, the present study aims to focus on individual cases of drug abuse. Unfortunately, parents often remain unaware that their children are engaged in drug abuse, sometimes discovering the problem only when their children are arrested by the police. Parents lack knowledge about recognizing the initial signs of drug abuse in their children and fail to realize that seemingly innocent activities such as smoking cigarettes or consuming alcohol can serve as the first steps towards drug abuse. Peer group pressure heavily influences children and adolescents who abuse drugs, and they strive to conceal their actions, making it challenging for teachers and parents/guardians to become aware of the situation. Thus, the researcher decided to directly question adolescents who abuse drugs to gain insights and empower all stakeholders in dealing with this problem.

Early age of initiation and poly-drug usage is another angle that often gets ignored when one studies substance abuse. While early age of initiation can derive its roots from bad influences, bad company, and easy access to illicit substances, it can severely alter the development process of the person especially if they are minor. Also, not to forget the lifelong implications of prolonged substance use. It is also notices from this study that the longer the person has been dependent on a particular substance, the harder it gets to seek help and recover. Poly-drug abuse can prove to be lethal and potentially life threatening when the substance users are consuming two, or sometimes even more substances together to achieve a higher sense of "high" or intoxication. This can lead to impairment of senses and a diminished sense of self-control, aversion and conscious.

The multifaceted problem of drug abuse cannot be addressed through a single approach. It necessitates comprehensive measures from various perspectives. Traditional teaching methods alone are insufficient, particularly when dealing with illiterate or semi-literate individuals struggling with addiction. Previous research has examined the issue from different angles, including medical and legal aspects, while others have highlighted socio-economic factors contributing to the problem. However, these studies have been inadequate in effectively combating the menace of drug abuse since they focused on singular aspects to resolve the problem.

It is anticipated that the findings of this study will enable prevention program implementers to pay adequate attention to pertinent environmental, social, and personal factors that play a critical role in preventing drug abuse. The outcomes of this study, highlighting what constitutes effective prevention programs, can greatly contribute to positive changes in drug abuse prevention practices, which can be replicated in other educational institutions. The control of drug abuse can be achieved through the implementation of the following strategies:

To prevent drug abuse, parents can: (i) **foster open communication** with their children, patiently listen to their problems, and teach them problem-solving skills, (ii) **take interest** in their children's activities and social circles, and (iii) **set a positive example** by abstaining from drug use themselves.

Another technique that that can be employed to speed up the process of recovery is to invest in upskilling. Transitioning from a state of mind that is dependent on a particular substance to one that is conscious about its decisions, is not an easy task. It needs a variety of different strategies. This is where upskilling or simply "learning something that one enjoys doing" can really help. Not only does it divert the person's mind from the repeated urge to indulge in something wrong but can also reestablish dopamine responses of the mind to activities other than substance use. Also, this new skill can empower the person socially and economically, reduce stigma and bridge the gap between them and the society.

Conclusion

Therefore, we can conclude that drug addiction has become a significant problem, particularly among the youth, with severe psychological, social, and economic repercussions. Traditional approaches have proven inadequate in addressing the multifaceted nature of drug abuse. This research emphasizes the importance of effective prevention programs that target social and environmental factors, aiming to discourage initial drug use and prevent its progression. By evaluating and refining prevention practices, this study seeks to empower stakeholders and create positive changes in drug abuse prevention, contributing to a healthier and more prosperous future for individuals and societies.

Recommendation

Assessing the effectiveness of prevention programs: It is crucial to comprehending the dynamics of drug abuse. This understanding is vital for formulating and revising drug abuse policies to improve the situation in Punjab. From the perspective of this study, only effective prevention programs possess the capacity to accurately address the core issues of drug abuse prevention. Therefore, assessing effectiveness is necessary to refine and establish the key elements of prevention.

Providing drug education: Targeting young college/ university students, particularly those living in hostels and away from parental supervision, as well as individuals residing in slums, industrial workers, truck drivers, and rickshaw pullers. The educational approach should actively engage people and promote the exchange of valuable information. Effective education should dispel misconceptions about artificial euphoria and instead provide authoritative knowledge on the physical and psychological effects of mood-altering drugs, their pharmacological properties, and medical uses. Parents should also play a crucial role in imparting this education.

Changing physicians' attitudes: Encouraging doctors to exercise caution in prescribing excessive amounts of drugs can significantly contribute to drug abuse control. Physicians should be more mindful of the potential side effects of medications. While drugs may provide relief, there is a risk of over-reliance. Often, patients receive a prescription that successfully treats their ailment, leading

them to continue using the drugs indiscriminately or excessively whenever they experience the same ailment. This practice of relying more on medication than on medical advice is dangerous.

Emphasizing the role of parents in controlling drug usage among their children. Parental neglect, hostility, rejection, and marital discord contribute to drug addiction. Therefore, parents should prioritize maintaining a supportive and harmonious family environment. As addiction is a gradual process marked by declining interest in studies, activities, and hobbies, irresponsible behavior, irritability, impulsive conduct, and a vacant expression, parents can identify early signs by remaining vigilant. They can ensure that their child withdraws from the habit.

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Quality of Healthcare Facilities: A Conceptual Analysis

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Abstract

This research provides a conceptual analysis of the quality of healthcare facilities, aiming to enhance our understanding of the multifaceted dimensions inherent in delivering high-quality healthcare services. The study employs a comprehensive approach to dissect the key components that contribute to the overall quality of healthcare facilities. Through an exploration of foundational concepts, this research seeks to establish a framework for evaluating and improving the quality of healthcare infrastructure. The conceptual analysis encompasses factors such as patient outcomes, safety protocols, accessibility, and patient satisfaction, offering a holistic perspective on healthcare quality. By synthesizing existing literature and theoretical frameworks, the study aims to contribute to the development of an in-depth understanding of the complex interplay of elements that define quality in healthcare facilities. Furthermore, the implications of this conceptual analysis extend to practical applications within healthcare management and policy development. Insights derived from this study can inform decision-makers on strategies for enhancing the quality of healthcare services, resource allocation, and the development of evidence-based practices.

Keyword: Quality, Healthcare, Facilities, Conceptual Framework

Introduction

The concept of health has been forwarded by one of the earliest known philosophers Boorse (1977) which was later elaborated by many other definitions. WHO (2006) also gave a more comprehensive definition of health and the healthcare system which acts as the guiding principles in healthcare systems throughout the world. The concept of health given by Boorse (1977) is the absence of diseases in the simplest form. It regards health as a value-free notion. It simply puts "Health as freedom from disease is then statistical normality of function, i.e., the ability to perform all typical physiological functions with at least typical efficiency." A "Disease is a type of internal state which is either an impairment of normal functional ability, i.e., a reduction of one or more functional abilities below typical efficiency, or a limitation on functional ability caused by environmental agents."

Another scholar Nordenfelt (2007) presented his 'holistic theory' (HTH) to address the issue of the concept of health. It refers to "not only survival but the quality of life of an individual." According to this theory, "A patient can be ill, not only if the probability of the patient's survival has been lowered but also if he/she does not feel well/ has become disabled about some goal other than survival." Accordingly, "A is completely healthy if, and only if, A has the ability, given standard circumstances, to reach all his or her vital goals." While "A has a disease if and only if, A has at least one organ which is involved in such a state or process as tends to reduce the health of A".

The definition of health cannot be taken as limited only to the absence of diseases. As per WHO (2006), "Health is a state of complete mental, physical and social well-being and not merely the absence of diseases or infirmity." This definition of health cannot be taken as an all-encompassing definition. It has been criticized as health involves a lot of other criteria which is not covered in the definition. Health has also been defined as "The ability to adapt and to self-manage, in the face of social, physical and emotional challenges as a reaction to the static nature of the WHO definition. In a similar nature, health has also been defined as "Continuing property that could be measured by the individual's ability to rally from a wide range and considerable amplitude of

insults, the insults being chemical, physical, infections, psychological, and social (Audy as cited in Meade and Erickson, 2000)."

Objective of Research:

The conceptual study of healthcare quality is undertaken with the overarching goal of improving patient outcomes, ensuring safety, and optimizing resource utilization. By systematically assessing and measuring the quality of healthcare, organizations aim to identify areas for improvement, establish benchmarks and standards, and inform policies that enhance the overall delivery of care.

Review of Literature

A thematic literature review was carried out for the study namely; the Quality of healthcare services and dimensions of quality of care.

Quality of Healthcare Services:

Quality of healthcare services has also been studied in public healthcare facilities like Primary Health Centres in India. Public health care has been provided in rural areas through primary healthcare centres, community healthcare centers and district hospitals through long-term and short-term plans ever since Bhore Committee (1946). It has been carried through various five-year plans and schemes and its importance has been asserted by an endless list of policies formulated by the government of India. Reproductive and Child Health Programme, National Health Programme for Communicable Diseases, Cancer, Diabetes, Cardiovascular diseases detection etc. to name a few, But the critical questions to be asked are whether the healthcare centres are functioning properly, whether the healthcare centres have adequate facilities and equipment, whether quality guidelines given by Indian Public Health Survey (2007 & 2012) are being followed properly. There is also the need to find out the role of healthcare providers in providing quality healthcare services and the constraints faced by them in delivering healthcare services. Often, narratives are perceived against the doctors but one also needs to look into the actual working conditions of the healthcare providers as a poor work environment acts as a deterrent against providing healthcare by the doctors, nurses, and staff. These problems need to be studied as they form an important part of quality care.

One of the most important aspects of studying quality care is the study of the perception of patients regarding the healthcare services being provided to them. Perception study is important as it gives an idea about how the user makes sense of the healthcare services being provided and the need to improve the healthcare services. However, the perception of patients can also be influenced by their socioeconomic background. Economically well of sections of the population may already have a perception that the quality of public healthcare facilities is poor. While those sections of the population who do not have any option but to depend upon public healthcare facilities may have a different perception.

WHO (2016) defined quality of care as "*The extent to which healthcare services provided to individuals and patient populations improve desired health outcomes. To achieve this, healthcare must be safe, effective, timely, efficient, equitable, and people-centred.*"

Ovretveit (1992) defined quality in health services as "Meeting the needs of those who need the services most, at the lowest cost to the organization, within limits and directives set by higher authorities and purchasers." Quality is poor in healthcare services due to 'badly designed and operated process, not from lazy or incompetent health workers. He is of the view that 'continual quality improvements come from giving people the new methods and skills to analyse quality problems and processes, and by empowering them to make the necessary changes. It does not simply come from inspection and standard-setting, nor simply from exhortation and customer relations training". Quality should also mean that the healthcare services are used by all those who need them apart from satisfying a few patients.

It is important to study the quality of healthcare as the state of healthcare in India is poor reflecting the need to improve it to provide good quality healthcare. Studies by Banerjee et al., (2004) and Bhandari & Dutta (2007) have found a huge shortage of infrastructure as well as human resources along with absenteeism. Banerjee et al., (2003) found that public healthcare facilities were highly inefficient and plagued by absenteeism while private practice was unregulated. 45 per cent of the nurses from sub-centers, 46 per cent from primary health centers, and community health centers were found to be absent which showed that the healthcare centers remained closed for more than fifty percent i.e., 56 per cent of the time. While Bhandari & Dutta (2007) found that there were 12 per cent, 16 per cent, and 50 per cent shortages of sub-centres, primary health centers, and community health centers respectively. Moreover, there was a huge shortage of human resources, for instance, 50 per cent of the sanctioned post in community health centres were found to be vacant in 2005. This shows that there is a need to study the quality of healthcare in India as sometimes healthcare facilities are found to exist as mere infrastructure rather than providing quality care which may lead to wastage of the infrastructure as well as resources spent upon building the infrastructure.

Continuing from the earlier argument that studying health will help ensure finding the ways and means to bridge the gap in the availability of healthcare to the people in turn helping the disease resistance of the community through support from healthcare facilities. It is equally important to study the quality of healthcare available as it will ensure that the resistance to diseases available to the people is built up through the availability of quality healthcare to the community at large. Also, studying the quality of healthcare is important for providing timely and effective healthcare services to people. Studying the quality of healthcare will help in finding out the areas where the healthcare is lacking and also find ways to improve it.

Various Dimensions of Quality of Healthcare:

The earliest study on service quality was done by Gronroos (1984) which talked about four dimensions in healthcare: *expected service and perceived service, promises and performance, technical and functional quality, and image as quality dimension.* "*Perceived* quality of a given service is the outcome of an evaluation process, where the consumer compares his expectations with the service he perceives has received, i.e., he puts the perceived service against the expected service. "Expectations of services can be measured in the same way as perceived healthcare quality can be measured. But in the Indian public healthcare context, the expectation on the part of the patient, which is always high, and measuring it against the perceived quality needs an altogether different study. Expectations can be studied using a separate index for expectations in various dimensions. Measuring expectations of patients as against their perceived service quality just to disconfirm the service quality is 'measuring neither service quality nor consumer satisfaction'. It is better to study the perceived service quality instead. Also, keeping in mind the nature of the study which is driven towards the availability of healthcare and then to find the quality of care, it is important to know how the community as well as the patients perceive the quality of services and not disconfirm their expectations against perceived quality.

The second dimension developed by Gronroos (1984) i.e., promises and performance related to *promises* done by traditional marketing activities such as 'advertising, field selling, pricing, etc.' to target the customers which may increase the expectations. While *performance* may include the technical part of a service as well as the psychological part of the user which is also known as expressive performance. In the Indian context, promises can be measured in private hospitals as well as public healthcare services. In private hospitals or clinics, the advertisements done by them to attract patients as well

as the quality care can be measured from literatures as well as a survey of the healthcare provider and patients. In terms of public healthcare centers in India too, promises given by the government in the form of healthcare schemes, national programmes etc. can be studied subjectively from the programme's literature of the government of India. It can also be measured through the perspectives of healthcare providers and users on the promises made and delivered by them. The same goes for the performance of healthcare facilities. But to study the performance of the healthcare facilities against the promises needs an in-depth study completely focused upon the processes of the services provided which cannot be done in the study due to certain technical limitations such as the requirement of in-depth knowledge of the medical field and also the fact that it has to be done by the concerned authority such as the government of India and the concerned department.

The third dimension developed by Gronroos (1984) includes technical and functional dimensions. *The technical* quality dimension is the "technical outcome of the process, i.e., what the customer receives as a result of his interactions with a service firm, is important to him and to his evaluation of the quality of the service." However, this technical quality will be influenced by the way it is transferred to the consumer functionally. Technical dimension can be measured in the study by checking the availability of healthcare facilities in the community healthcare centres and the consumer perception of the quality of healthcare provided. The availability can be studied in two forms the availability of essential healthcare facilities and the essential human resources. "*Functional* quality corresponds to the expressive performance of a service". It tends to be subjective and deals with how the consumer gets quality service not what the consumer gets which comes under technical quality. This part can be studied from the perspectives of users which is the patients in terms of how the healthcare providers deliver services. The last dimension developed by Gronroos is *image* may be in the form of corporate image, organizational image, or the image of a local officer which can be built up by the technical and functional quality as well external factors such as 'tradition, ideology and word-of-mouth'.

Research on quality of care is usually done in the perception of patients or consumers. However, there is a need to explore the problems faced by healthcare providers in providing healthcare services to patients in a public healthcare setting.

Parasuraman, Zeithaml & Berry (1985) talked about service quality in four service businesses and built a model to improve the quality of services. They proposed a model of service quality based upon five gaps that

existed between executive perceptions and consumer expectations of service quality, difficulty in fulfilling consumers' expectations on the part of the management, the third gap exists because it is difficult to standardize the performance of health patients new. The other gaps include the gap between advertising to media and communicating it to the consumers and the last gap is "meeting or exceeding what consumers expect from the service". This model is known as the GAPS model. The GAPS model is an improvement over the Gronroos model as it intends to measure gaps in expectations and perceptions of service quality, standardizing the performance of the healthcare providers etc., and hence cannot be adopted in the study for the same reason that the expectation and perceived quality cannot be measured i.e., disconfirming the expectation against the perceived quality is not a good measure of the quality of care. Ten determinants given in the GAPS model include reliability, responsiveness, competence, access, courtesy, communication, credibility, security, understanding or knowing the customer, and tangibles.

Parasuraman, Zeithaml & Berry (1988) further modified the gaps model and gave five dimensions for measuring the service quality known as SERVQUAL (service quality). It included tangibles, reliability, responsiveness, assurance, and empathy. Tangibles include the "physical facilities, equipment and appearance of patients new". Reliability means "the ability to perform the promised service dependably and accurately." Responsiveness means the "willingness to help customers and provide prompt service". Assurance includes the "knowledge and courtesy of employees and their ability to inspire trust and confidence". Empathy means "caring, individualized attention the firm provides its customers". In the Indian context, tangibles can be measured in the form of the availability of physicians, specialist doctors, staff, Minor Operation theatre, emergency services etc. Reliability can be measured only from the perspective of the patients which itself is not an accurate measure as the performance of services accurately can only be done by the patients with technical knowledge. Responsiveness of the healthcare provider can be measured through the perception of patients and observers by their friendly attitude towards the patients and relatives. Likewise, the assurance and empathy of providers can be measured through the way medical treatment is provided, their co-operative attitude and their understanding towards the patient.

Donabadien (1988) put forward the Structure, process and Outcome (SPO) model to overcome the lack of patient focus in the quality of healthcare studies. Study of outcomes in various forms such as "of restoration, of recovery and survival has been frequently used as

an indicator of the quality of medical care". The study of structure as a quality measure studies the settings in which healthcare takes place and the 'instrumentalities of which it is the product.' It may include the study of administrative and related processes that support and direct the provision of care. The processes part of the study deals with whether the application of 'what is known to be good medical care' has been applied or not and not with the power of medical care. The outcome has been taken as a reliable measure of the quality of healthcare and its reliability is seldom questioned. However, the outcome may not be the best measure of the quality of certain diseases which may not be life-threatening but is most likely to 'produce suboptimal health or crippling conditions.'

Hawthorne (2012) studied the quality of healthcare from an altogether different perspective using GIS street network distances and creating a Satisfaction Adjusted measure (SAD) of quality of care. Moreover, in-depth interviews with 65 participants were conducted to get a "perceived distance-based analysis of healthcare accessibility." Questions were asked based on the Likert scale about quality-of-care experiences. The new perceived distance was combined with the conventional street network distance. This study is useful for accessibility studies and finding out the differences in "perceived distance and quality of care in lower-income urban communities" and does not apply to quality-of-care studies alone.

Berwick, Snair & Nishtar (2018) cited the Institute of Medicine (IOM) framework for healthcare system service quality includes safety, effectiveness, efficiency, patient-centeredness, equity and timeliness, accessibility, and affordability. Safety means "avoiding harm to patients from the care that is intended to help them". The feasibility of conducting a study of safety in quality care has been discussed before and the same applies here too.

Table 1   Dimensions of quality of healthcare services based on previous literature

Author/Model used by previous literatures	Dimensions used
Gronroos (1984)	• Expected service & Perceived service • Promises & performance • Technical and functional quality • Image as quality dimension

Parasuraman, Zeithaml & Berry (1985) - GAPS MODEL	• Gap in executive perceptions & consumer expectations of service quality. • Difficulty in fulfilling consumer expectations as a part of the management. • Standardize the performance of health patients. • Gap in advertising to media & communicating it to consumers. • Gap meeting or exceeding what consumers expect from the service.
Parasuraman, Zeithaml & Berry (1988)- SERVQUAL MODEL	• Tangibles. • Reliability. • Responsibility. • Assurance. • Empathy.
Donabadien (1988)- SPO	• Structure. • Process. • Outcome.
Cronin & Taylor (1992)	• Relationship between • Service quality. • Consumer satisfaction. • Purchase intention.
Ovretveit (1992)	• Three dimensions • Client quality • Professional quality • Management quality
Panchapakesan et al., (2009) - suggested dimensions of hospital study.	• Infrastructure. • Patient quality. • Process of clinical care. • Administrative procedure. • Safety indicators. • Hospital image. • Social responsibility. • Trustworthiness of the hospital
Lee (2016)	• Empathy • Tangibles • Efficiency • Safety • Degree of care services
IOM (Berwick, Snair & Nishtar, 2018)	• Safety. • Effectiveness. • Efficiency. • Patients-centeredness. • Equity. • Timeliness/accessibility.

Source: Author

Conclusion

Quality of healthcare is an important aspect of ensuring good health. A robust understanding of healthcare quality allows for a nuanced discussion on improving patient outcomes, safety, and overall effectiveness of healthcare delivery. By delving into these concepts, healthcare providers can identify areas of improvement, streamline processes, and enhance the patient experience.

Moreover, such studies contribute to the ongoing discourse surrounding healthcare policy and reform. Policymakers can leverage insights derived from the examination of healthcare quality to shape regulations, allocate resources effectively, and implement evidence-based practices. This, in turn, has the potential to optimize healthcare systems, making them more efficient, accessible, and equitable.

Additionally, studying the quality of healthcare is pivotal in fostering a culture of continuous improvement within the medical community. It encourages healthcare professionals to adopt evidence-based practices, adhere to standardized protocols, and engage in ongoing education to stay abreast of advancements. Ultimately, a focus on healthcare quality ensures that the medical field evolves in tandem with the evolving needs of patients and society, fostering a healthcare ecosystem that prioritizes excellence and patient well-being.

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Assessing the Disproportionate Effects of Disasters on Vulnerable in India: Implications for Achieving Sustainable Development Goals

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Abstract

Disasters- both natural and man-made, have a profound impact on countries worldwide. However, the effects are not uniform, as they disproportionately affect vulnerable regions and communities. This study conducts a comprehensive analysis of India's disaster landscape scrutinizing the frequency of catastrophes and their impact on the economic and social development of the country highlighting disaster-prone regions. By using regression and correlation tools we examine the frequency and impact of the disasters on GDP, inequality, Poverty, Unemployment, and Climate change from the lens of annual temperature and rainfall to gain insights into disaster vulnerability in India. Additionally, we analyze the flash flood scenario in India over six decades by focusing on the Kerala floods-2018 Vs. Uttarakhand Floods 2013 and the recent Joshimath Disaster. Through an in-depth exploration of India's disaster vulnerability, the study contributes to a broader discourse on building resilience through the effective implementation of sustainable development. Thus, we emphasize, the imperative to align government efforts, with sustainable development goals acknowledging the intersectionality of disasters with inequality, poverty, and climate change.

Keywords: Disaster, SDGs, Vulnerability, Inequality, Climate Change, Resilience

Introduction

India has been susceptive to natural calamities such as floods, cyclones, earthquakes, landslides, tsunamis, etc. due to its geo-climatic characteristics. Approximately 68% of the area is sensitive to droughts, 60% of the landmass to earthquakes of varying magnitude, over 40 million hectares to floods, and 8% of the total area to cyclones. Every year between 1990 and 2000, there were approximately 4344 fatalities and 30 million people who were affected by disasters. A report titled *India 2022: An Assessment of Extreme Weather Events* revealed that most people were killed as a result of these incidents in Himachal Pradesh (359), followed by Assam and Madhya Pradesh (301). According to the data, Assam reported the most destroyed homes and animal deaths.

Over 50% of the cropland in the nation was impacted by an extreme weather event that lasted 82 days in Karnataka. Geographically, India's central and north-western regions reported the most days with extreme weather events (198 and 195, respectively). The East and North East of India came in second (783 deaths), and central India came in first (887 deaths).

The amount of individual, communal, and public assets lost has been enormous and it is disproportionate. A peculiar feature observed across the globe regarding the incidence and impacts of disasters is that there are certain regions and communities where the vulnerability to catastrophic phenomena is higher than others. Understanding vulnerability can be difficult since it frequently refers to several concepts such as fragility,

lack of capacity, heightened sensitivity, weakness, etc. Numerous factors, including the state of the economy, the environment, and the availability of resources and information, have an impact on vulnerability in the context of catastrophes. By incorporating vulnerability into our understanding of disaster risk, we acknowledge the fact that disaster risk is a reflection of both the susceptibility of people and economic assets to suffer loss and damage in addition to the severity of the hazard or the number of people or assets exposed. Since the disaster risk is higher among the marginalized, mitigation efforts and attempts to increase resilience, risk governance, and policy formulation should be oriented towards vulnerable communities more than the population who is not as susceptible to the calamities.

In the backdrop of this, the chapter delves deeper into disaster vulnerability while comparing with macroeconomic parameters of India such as GDP, SDG Index, Poverty Rate, Inequality (Gini Coefficients), Economic loss due to disasters, government expenditure on relief, loss of lives, Population index, and Demographic Composition, etc. Additionally, an attempt is made to explore certain case studies with special referece to flash floods through a comparative analysis of Kerala floods-2018 Vs. Uttarakhand Floods 2013 and Joshimath disaster from the lens of vulnerability and how certain natural disasters are driven by development-oriented projects.

Review of Literature

Several studies have been investigating the disproportionate impacts of disasters on vulnerable regions and communities. Following are some of the studies examining the same in India and across the globe.

Ariyabandu, M. M. (2005). Stated, that for all facets of growth, disasters are a severe threat. In developing nations, 90% of all-natural disasters and 95% of deaths resulting from them happen. By 2025, it is predicted that 80% of the world's population will reside in developing countries and be at risk from natural disasters.

Kimuli et al. (2021) performed a multisource trend analysis of floods in the Asia Pacific from 1990 to 2018, assessing their implications for SDG 13 (Climate Action). They found that these disasters have been detrimental to prior progress, underscoring the urgency for concerted climate action by all stakeholders. The study highlights the importance of further research to fully grasp the disaster's impact on vulnerability and to formulate effective action plans.

Tasri, E. S., Karimi, K., & Muslim, I. (2022) explored the effects of unemployment and poverty on catastrophe losses, the causes of income disparity in Indonesia caused by disasters, and the causal connection between disaster losses and income inequality and showed empirical evidence for the same.

Sam. A. et al. (2021) investigated flood security in Eastern India and its implications on food security. India is an agrarian country with several flood-prone areas. Farming communities in these regions are highly vulnerable to the disaster risk. The interlinkages with agriculture pose grave challenges to the SDGs such as – No poverty, zero hunger, and climate action.

Pramanik, Malay, et al. (2021) conducted a study to analyze the impacts of COVID-19 and Amphan Cyclone on SDGs in the region of Sundarban, India- a multi-hazard region of the country at the Bangladesh border. In the wake of Cyclone Amphan and the context of the COVID-19 pandemic, this study examined the effects on local livelihoods and tracked the advancement of the Sustainable Development Goals. The study indicated a negative impact on the livelihood systems of the Sundarbans' most vulnerable populations.

Kushwaha et al. (2023) conducted a critical review of the localization of SDG 11 in South Asia, with a focus on implications for India. South Asian countries, housing one-fifth of the global population and experiencing rapid urbanization, are central to sustainability challenges. The study identified key drivers for success, including open institutional and financial systems, stakeholder engagement in resource allocation, robust data ecosystems promoting social innovation, and flexible policy reforms fostering innovative solutions. These factors can guide Indian cities in establishing a contextual framework for SDG 11 and driving informed policy decisions toward a transformative paradigm shift.

Singh. P, (2023) highlighted the gender dimension of disaster risk, emphasizing that impoverished rural women are particularly vulnerable to climate change impacts due to their subordinate status and limited access to resources. In India, women often engage in climate-dependent traditional occupations, many of which are disappearing. This trend negatively affects household income, social security, women's and girls' health, and education, leading to rural-urban migration driven by climate-induced challenges. Recognizing and addressing this gender-specific aspect of climate variability is crucial.

Objectives of the Study

1. To analyze the relationship between Inequality and Climate Change in India.

2. To gain insights into financial damage caused by Disasters on Gross Domestic Product.

3. To gain an understanding of the implication of disaster vulnerability on Sustainable development goals with a focus on SDG1- No poverty, SDG10- Reduced Inequality, and SDG13 – Climate action.

4. To investigate the trends of disasters in India between 1990-2023 through geographic and demographic perspectives.

Hypothesis

- H0: Inequality is influenced by the Climate Change

- H1: Inequality is **not** influenced by the Climate Change

- H0: The frequency of disasters and Poverty are inversely proportional to each other.

- H1: Frequency of disasters and Poverty are **not** inversely proportional to each other.

- H0: Gross Domestic Product and financial loss caused by disasters have a negative correlation.

- H1: Gross Domestic Product and financial loss caused by disasters **do not** have a negative correlation.

Research Methodology

The study is a blend of descriptive and exploratory research methods as it attempts to explore the correlation between disaster vulnerability with economic indicators such as GDP, Poverty, and inequality along with providing a qualitative explanation of the same. The data utilized for analysis is secondary. The considered data is collected from various government and non-government databases, reports, websites, and other forms of literature reviewed. The data sets considered were for a time frame of 32 years i.e., 1990 - 2022 as follows:

- Frequency of Disasters

- GDP of India (in USD)

- Damage caused by Disasters as a percentage of GDP

- Inequality index of India (Gini coefficient)

- Poverty Rate in India

- Mean Annual Temperature

- Annual rainfall

- Per Capita CO_2 emission

Discussion

Figure1- emphasizes that while poverty and inequality are growing in opposite direction to each other in India. Between 2000 and 2019, India's income per person increased by five times. This does not imply that everyone in society is now earning more money.
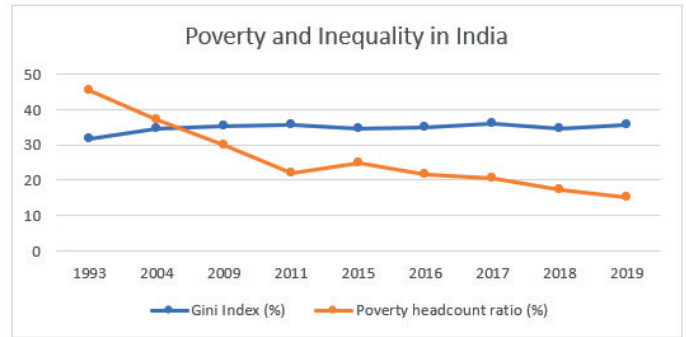
Fig 1   Poverty and Inequality in India (Authors' visualization based on NSSO data on Poverty and Inequality)

In 2019, 21% of India's income went to the wealthiest one percent of citizens. For 1990, this was 11%. In 2019, the country's richest 10% earned 56% of the total income, while the bottom 10% took home just 3.5%. The Gini coefficient, which measures income distributional disparity, indicates rising inequality in India. In 2014, the coefficient was 34.4% In 1993 and 2019, the coefficient rose to 31.7% and 35.7%, respectively. Disasters aggravate the already existing phenomenon of unequal distribution of wealth and inequality.
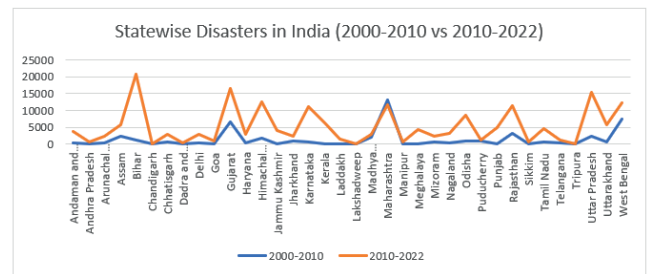
Fig 2   State-wise Disasters in India 2000-2010 vs. 2010-2022 (Compiled and Visualized by Authors based on data from nidm.gov)

Fig:2 shows the disasters in India from 2000-2010 and 2010-2022. It can be interpreted that the frequency of disasters has increased significantly in the latter decade. States with a higher number of natural calamities are Assam, Bihar, Gujarat, Maharashtra, Odisha, Tripura, Himachal Pradesh, Uttarakhand and Uttara Pradesh. These states belong to the humid Subtropical Climatic region. Thus, it is strong evidence of geographical and climatic inequality of disasters.
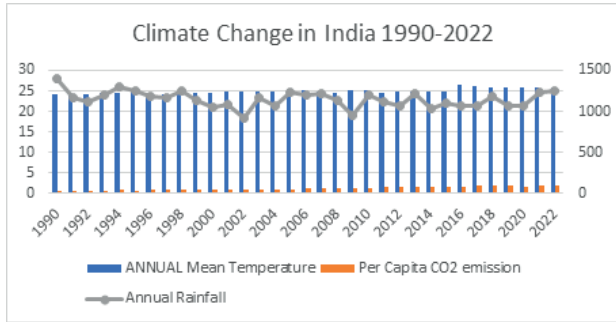
Fig 3   Climate Change in India 1990-2022 (Compiled and Visualized by authors based on various databases referred)

Fig 3 demonstrates the trends in climate change parameters considered – Mean temperature, Rainfall, and Per Capita CO_2 emission in India. In 1990 per capita CO_2 emission was 0.62 which increased to 1.95 reflecting a massive increment. Annual mean temperature has increased from 24.21 to 26 between 1990 and 2022 respectively. It can be noted that it is in tune with the rate of global warming i.e., 2^0 as noted by IPCC. Rainfall does not have a constant pattern and it lies between 1100 mm to 1400 mm in the past 32 years.

Hypothesis Testing

Regression Analysis- Inequality and Climate Change

- H0: Inequality is influenced by Climate Change.
- H1: Inequality is not influenced by Climate Change.

Econometric Model

$Y = 0i + 0.008588 * X1 + 0.571934 * X2 + 0.843882 * X3 + e$
------------------------------(1)

Equation (1) shows the linear relationship between inequality and climate change derived from regression analysis, where Y= Inequality, X1= Annual mean temperature, X2= Per Capita CO_2 Emission, X3= Annual rainfall, e= error term, i= intercept and associated are the coefficient values.

The following table is the result of the Regression of Inequality with Climate Change Variables – (Mean temperature, per capita CO_2 Emission, and Annual rainfall.

Table 1   Goodness of fit and F significance

Multiple R	0.9995
R^2	0.9990
Adjusted R^2	0.8320
F significance	0.0000

Since R^2 is 0.99 it denotes goodness of fit and very high correlation between dependent and independent variables. Thus, the model demonstrates that our dependent variable Inequality is highly influenced by the dependent variables of Mean annual Temperature, Per Capita CO_2 emission, and Annual rainfall. F significance of 0.000 in regression provides strong evidence that the model is statistically significant and that the independent variables collectively have a meaningful impact on the dependent variable.

Table 2   P- Test Based on Regression Analysis

Variables	P-value	Significance	Hypothesis testing
Annual Mean temperature	0.008588	0.008<0.05 (Significant)	H0 is rejected.
Per Capita CO_2 Emission	0.571934	0.57>0.05 (Insignificant)	H0 is accepted.
Annual Rainfall	0.843882	0.84>0.05 (Insignificant)	H0 is accepted.

Here, the Per Capita CO_2 Emission and rainfall influence the inequality to a large extent. While the annual mean temperature doesn't show a direct influence on inequality from the above analysis. However, we need to note that annual temperature impacts other climate variables and it is increasing every year at a gradual pace which can result in a larger change in the future when seen with an elongated time frame. Annual rainfall also influences inequality, as it is erratic.

Correlation Analysis

- H0: Frequency of disasters and Poverty are inversely proportional.

  H1: Frequency of disasters and Poverty are not inversely proportional.

- H0: Gross Domestic Product and financial loss caused by disasters have a negative correlation.

  H1: Gross Domestic Product and financial loss caused by disasters do not have a negative correlation.

Table 3   Correlation Analysis

	Correlation Coefficient	Remarks	
Inequality (Gini coefficients) and frequency of disasters	0.250533	Weak Positive Correlation	Inequality and frequency of disasters weakly inverse proportional.

Disaster frequency and Multidimensional poverty Index of selected states	0.619868	Positive-Correlation	Disaster and Poverty are directly proportional.
Poverty headcount ratio and disaster damage as % of GDP	0.313872	Weak Positive Correlation	Poverty headcount ratio and financial damage by disasters as a share of GDP have a weak direct relationship.
GDP of India and Financial Loss as a percentage of GDP	-0.28236	Negative correlation	GDP and Financial loss as a percentage of GDP are inversely proportional.

Thus, we accept the null hypothesis in both the cases as Frequency of disasters and Poverty are inversely proportional to each other and the Gross Domestic Product and financial loss caused by disasters have a negative correlation.

Case Study 1: Flash Floods in India
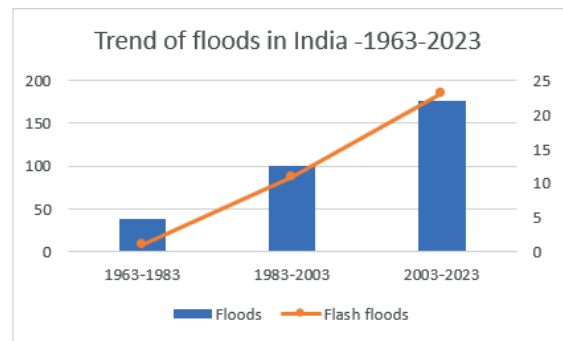
Fig 4 *Trend of floods in India 1963-2023* (Authors' compilation and visualization based on CRED and EM-DAT)

Fig 4 demonstrates the vicennial trends of floods and flash floods in India. Over six decades India has witnessed significant escalation in both floods and flash floods. From 1963-1983 there were instances of 38 floods and 1 flash flood, while the time frame between 2003-2023 experienced 176 floods and 23 flash floods. This is a massive 363.16% surge in case of the frequency of the floods in the country.

Against this backdrop, we analyse the Uttarakhand Flash flood-2013 and the Kerala Flash flood-2018.

Table 4 *Snapshot of Uttarakhand Flash Floods-2013 and Kerala Flash Floods-2018 (Compiled by authors' from NIDM reports & literature reviewed)*

Year	GSDP	SDG rank	Population Density (As per Census 2011)	Reason for flash flood	Life loss	Economic damage	Sector with Highest Damage
2013	149074	5	189	Heavy Rainfall, Eruption of rivers-Mandakini, Lake, Glacial Melting-Chorabari	4190	Rs.50000-Cr	Tourism and agriculture
2018	772894	1	860	High Rainfall, Inefficient management of Dams, Overflow of rivers, Blockage in water bodies, etc.	339	Rs.31000-Cr.	Agriculture and Allied Activities

The 2013 Kedarnath floods caused extensive damage, including $195 million in lost tourism revenue and $285 million in bridge and road repairs, and believed deceased deaths are 4169. The 2018 Kerala floods caused enormous damage, resulting in 339 fatalities and a ₹31,000-crore overall economic loss. The primary areas of economic impact included substantial agricultural losses totaling ₹27,839.9-crore, damage to homes estimated to cost ₹7,357.104-crore, and substantial infrastructure losses, including damage to roads and bridges, totaling ₹9,538.45-crore. Including ₹7,434.0697-Crore in urgent aid for food and clothing, ₹23015.65 lakh for search and rescue, and other expenses for power, water supplies, and irrigation, the government spent ₹27100 lakh on relief activities. These figures demonstrate the scope of the losses and the enormous financial commitment made by the government to the rescue and recovery operations. Despite variations in their Sustainable Development Goal (SDG) rankings, both Kerala ranked first, and Uttarakhand ranked fifth, have encountered

notable difficulties in disaster relief and management. These challenges persist due to the unique geographical, ecological, and social vulnerabilities inherent to each state. This underscores the imperative for intensified efforts aimed at addressing and reconciling SDGs associated with climate change and inequality. The SDG rankings alone inadequately encapsulate the multifaceted complexities associated with disaster resilience and sustainable development.

Case Study 2 - Joshimath Disaster

In 2022, Joshimath, located in the Chamoli district of Uttarakhand, faced a significant crisis as cracks appeared in buildings and frequent landslides and flooding were reported. Uttarakhand government attributed the sinking of several areas in Joshimath to a combination of natural and human-induced factors. One significant factor contributing to the instability in Joshimath is its location on an ancient landslide deposit, not on solid rock. The undermining of the land by the Alaknanda and Dhauliganga rivers further exacerbates the problem. Additionally, the region's geology comprises scattered rocks covered in old landslide debris with a low bearing capacity, especially when saturated during monsoons. The proliferation of construction activities, hydroelectric projects, and the expansion of the national highway have made the slopes increasingly unstable. Land erosion from streams and natural waterways has also played a role in the deteriorating condition.

The impact of these factors has forced 66 families to evacuate, with 561 houses reporting cracks, affecting over 3,000 people. Many residents in Joshimath have been employed in the tourism sector, working as tour guides, hotel staff, or in small businesses catering to tourists. With the destruction of infrastructure and the decline in tourism, these individuals lose their primary sources of income. Poorer residents have been living in vulnerable areas with inadequate housing, making them more susceptible to the effects of landslides and flooding. The destruction of their homes exacerbates their vulnerability. Loss of income leads to food insecurity and non-accessibility of healthcare and education services.

Uttarakhand's 5th position in the SDG rankings reflects commendable progress in various aspects of sustainable development. However, the state's unique vulnerabilities, particularly in the realms of disaster resilience and climate change adaptation, demand a more targeted and all-encompassing strategy. Moreover, Uttarakhand's district-level SDG computation does not include SDG 10- Reduced Inequalities and SDG-12 Climate Change due to unavailability of data. This indicates the loopholes and shortcomings in SDG index Calculation. The sinking of Joshimath is a complex issue influenced by geological, environmental, and human factors. To save the town, immediate measures like halting development and relocating residents are necessary, along with long-term efforts such as improved drainage planning and reforestation. Collaboration between various stakeholders and a focus on scientific studies are crucial for sustainable solutions.

Implication to SDGs and Policy Suggestions

The analysis offers several crucial policy recommendations and consequences for tackling the difficulties faced by catastrophes, inequality, and their effects on India's Sustainable Development Goals (SDGs):

- The increasing income inequality trends highlight the need for policies aimed at reducing wealth disparities. Measures such as progressive taxation, social safety nets, and targeted welfare programs can help redistribute income and bridge the gap between the rich and the poor. This reduction in inequality is essential for achieving SDG goals related to poverty reduction and reduced inequalities.

- The geographical distribution of disasters, as seen in Fig-2, suggests the need for region-specific disaster management plans. Tailoring disaster response strategies to the unique characteristics of each region can help reduce the disproportionate impact of disasters on vulnerable populations and promote regional equality (SDG 10).

- To tackle the alarming rate of climate change Policymakers should prioritize climate change mitigation efforts, including transitioning to renewable energy sources, enhancing energy efficiency, and reforestation programs. These actions are crucial for achieving SDG 13-Climate Action.

- Since there is a strong link between disasters and poverty, it is important to integrate climate-resilient development strategies into poverty reduction efforts (SDG 1) to ensure that vulnerable populations are better prepared to cope with the impact of disasters.

Conclusion

In the context of India's pursuit of the Sustainable Development Goals (SDGs), this study has shed light on the complex interactions between catastrophes, climate change, and inequality. The findings showcase the alarming rise in income inequality over the years, emphasizing the imperative of redistributive policies to bridge the wealth gap. The escalating frequency of disasters, especially in the latter decade, underscores the critical need for proactive disaster risk reduction measures and climate change mitigation strategies. These challenges have a significant bearing on India's progress

toward SDGs, especially those related to poverty reduction, climate action, and reduced inequalities. Furthermore, the study underscores the need for region-specific disaster management plans and improved data infrastructure to enhance disaster risk assessment and SDG monitoring.

As India navigates its complex path toward sustainable development, policymakers must recognize the indivisibility of these challenges. An integrated approach that addresses inequality, invests in disaster preparedness, promotes climate-resilient development, and acknowledges regional disparities is paramount. In doing so, India can not only achieve its SDG targets but also foster a more equitable, sustainable, and resilient future for all its citizens. Ultimately, the success of India's development journey hinges on its ability to confront these multifaceted challenges head-on and implement evidence-based policies that leave no one behind in the pursuit of sustainable development.

Limitations and Scopes

The study faced data limitations regarding Gini coefficients and economic damage in Uttarakhand, necessitating reliance on data availability for particular years and resorting to estimations in such instances. Promising avenues for future research involve conducting nuanced state and district-level studies, enabling cross-state and cross-region analyses, with a particular focus on climate variables, to derive a holistic understanding of SDG implications for India.

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Silent Epidemic or Silenced Epidemic: Positioning Polycystic Ovary Syndrome in Sustainable Development Goals

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Abstract

Polycystic Ovary Syndrome (PCOS) is a neglected, non-communicable endocrine disorder affecting women worldwide. It is a recognised multisystem disorder associated with Type 2 Diabetes, cardiovascular disease, endometrial cancer, increased risk of depression, anxiety, bipolar disorder, eating disorder and obsessive-compulsive disorder. While the mean prevalence of PCOS in India is 21.27 per cent of the female reproductive population, there is currently no reliable data on the diagnosis rates. The Sustainable Development Goal (SDG) 3 Good Health and Well-Being: Ensure healthy lives and promote well-being for all at all ages includes target 3.4 to reduce mortality from non-communicable diseases and promote mental health; target 3.8 to achieve universal health coverage; target 3.9 to reduce illness and death from hazardous chemicals and population and target 3.D to improve early warning systems for global health risk. Progress on these targets requires a pertinent focus on diagnosing, preventing, and managing PCOS. Additionally, reducing non-communicable diseases like PCOS is an essential target in determining the success of at least nine SDGs. This paper positions PCOS in SDGs using conceptual mapping to identify and establish the interlinkage between PCOS prevention and management and SDGs. These findings highlight the need for gender-sensitive policies and emphasise the importance of tailored screening and prevention programs to guide the development of Universal Health Coverage in an androcentric healthcare system.

Keywords: *Polycystic Ovary Syndrome; Sustainable Development Goals; Non -Communicable Diseases; Mental Health.*

Introduction

The 2030 Agenda for Sustainable Development, declared in September 2015, presented 17 Sustainable Development Goals (SDGs) and 169 associated targets, marking a pivotal point in global developmental strategies. Building upon the Millennium Development Goals (MDGs), this new vision was unanimously adopted by 193 member countries in January 2016. The focus pivoted towards key tenets—People, Planet, Prosperity, Peace, and Partnership. The SDGs are ambitious, as they attempt to transform the world; Perhaps the most overambitious goal is Goal 3: *"Ensure Healthy lives and promote well-being for all at all ages"* Under this overarching aim, Target 3.4 commits *to "reduce by one-third premature mortality from non-communicable diseases (NCDs) through prevention and treatment and promote mental well-being"* by 2030 (United Nations, 2015). Notably, this target emerges in the SDGs as a corrective measure, addressing the oversight of Non-Communicable Diseases (NCDs) in the MDG era.

NCDs, often synonymous with chronic diseases, tend to have a disease progression of long duration and emerge from a confluence of genetic, physiological, environmental, and behavioural elements (World Health Organisation, 2018). Disturbingly, NCDs have a disproportionate impact on populations in low and middle-income nations like India, accounting for a staggering 85 percent of all premature deaths. The Indian Council for Medical Research underscores that deaths attributable to NCDs increased from 37.9 percent in 1990 to 61.8 percent in 2016. on par with the global increase in the burden of NCDs.

Polycystic Ovary Syndrome (PCOS), an endocrine disorder with an unknown aetiology, remains a relatively neglected non-communicable disease affecting women globally. With a mean prevalence rate of 21.27 percent among the female reproductive population, (Deswal et al., 2020) PCOS was dubbed a silent epidemic in India, killing women prematurely with the associated long-term comorbidities like Cardiovascular diseases, Diabetes and Endometrial, Ovarian and Breast Cancers. Additionally, recent studies highlight a concerning link between PCOS and heightened risks for mental health disorders, like depression, anxiety, bipolar disorder, eating disorders, and obsessive-compulsive disorder Barry (2019). Data from ICMR, PHFI, and IHME (2017) further emphasizes the gravity by revealing an uptick in Disability-Adjusted Life Years (DALYs) for women with cardiovascular diseases from 2.9 percent in 1990 to 6.6 percent in 2016. Concurrently, DALY rates for diabetes and breast cancer in women witnessed increments, from 0.7 percent to 2.2 percent and from 0.7 percent to 0.9 percent, respectively.

PCOS has rapidly emerged as a significant public health concern in India. Noting its growing prevalence, on 26 July 2019, the Minister of Family Health and Welfare, Shri Janardan Singh Sigriwal, addressed the issue in the Lok Sabha, responding to the unstarred question number 5502 about PCOS cases in the nation. This highlighted the growing apprehensions surrounding this intricate and heterogeneous condition. In 2013, India took a pioneering step by becoming the first nation to join the global monitoring framework dedicated to major Non-Communicable Diseases (NCDs). Regrettably, this framework overlooked the inclusion of PCOS, a crucial NCD (Sivanantham et al., 2021). While PCOS prevention and management (P&M) have been recognized at both the national and international levels, the global development community—with its expansive agenda from gender equality to climate change and health—has yet to adequately emphasize the role PCOS prevention and management plays in advancing the Sustainable Development Goals (SDGs).

This paper presents a comprehensive exploration of the existing and potential linkages between PCOS and the SDGs. It also identifies the priority targets related to PCOS for health sector to monitor. By underscoring the potential implications of PCOS P&M in realizing the SDGs, and highlighting how it can be monitored within these goals, this paper aims to accentuate the fundamental role of PCOS P&M in reducing poverty and inequalities, improving health and well-being, ensuring gender equality, and propelling economic growth.

Positioning Polycystic Ovary Syndrome in Sustainable Development Goals: A Framework

In addressing global health priorities, the importance of PCOS Prevention and Management aligns with the SDGs in these particular ways: (See Figure 1)

1. PCOS P&M directly supports specific SDGs, but its role often goes unnoticed or isn't thoroughly studied;

2. Progress towards certain SDGs can shape PCOS P&M, highlighting its significance in gender-centric health initiatives.

3. PCOS P&M and certain SDGs share a bidirectional relationship, influencing each other. This underscores the importance of prioritizing it in health dialogues.
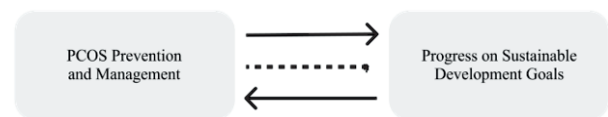
Figure 1 *Relationship between PCOS P&M and Sustainable Development Goals (SDGs)*

Linkages between the SDGs and PCOS can be made evident by questioning how the overall achievement of a given SDG may be altered if PCOS is not addressed. For example, in examining SDG3, which focuses on health, is it possible to achieve health and wellbeing for all if there is no access to preventative healthcare for PCOS? If not, the global community must consider the policy levers available to address this gap. Or, in examining SDG5, is it possible to end all forms of discrimination against women and girls everywhere if the androcentric healthcare system doesn't account for better policies to diagnose, treat and prevent PCOS? If not, governments must consider resource investments to address this need.

The linkages between the SDGs and PCOS becomes evident when assessing the potential implications of neglecting PCOS P&M on the successful realization of SDGs. For instance, the SDG3, which champions universal health and well-being, one must question the feasibility of achieving this objective without ensuring comprehensive preventive healthcare for PCOS. Similarly, Considering SDG5's commitment to ending discrimination against women and girls, it's critical to evaluate the existing health system, which many view as androcentric-centric. If this system falls short in addressing PCOS—from diagnosis to treatment and prevention—it signals a clear need for governments to shift resources and reshape policies, keeping women's health front and center.

Over the last decade, there has been significant growth in attention to PCOS and its related co-morbidities. However, despite this significant growth, PCOS remains

underacknowledged, underfunded, dismissed and risks continued marginalization unless its relevance across development goals is explicitly highlighted. Moreover, there lacks a consistent and universally accepted method for monitoring PCOS, which hinders the assessment of PCOS related outcomes over time. The SDGs framework provides an opportunity to demonstrate how interconnected PCOS P&M is with other globally recognized priorities and it may also facilitate the development of indicators and measures that could be integrated into systems already created for tracking each linked goal. If these ties between PCOS and the SDGs aren't clearly emphasized and monitored, PCOS risks being overlooked or deemed 'irrelevant' to various sectors. Therefore, identifying these explicit linkages is critical to making sure PCOS is appropriately acknowledged and addressed.

The Potential Contribution of PCOS P&M Towards SDGs

This paper primarily examines the ways in which PCOS P&M interacts with and potentially benefits from other SDGs, with a specific focus on Target 3.4. Within this framework, several SDGs have emerged as notably relevant to PCOS P&M.

The Sustainable Development Goals (SDGs) demonstrate key connections with NCD target 3.4, particularly in relation to nine SDGs, as deduced through a network analysis approach developed by the UN Department of Economic and Social Affairs (Le Blanc., 2015). These crucial SDGs include: SDG 1 - Reduction of poverty (Jamison et al., 2013), SDG 2 - Eradication of hunger (Hu, 2002), SDG 3 - Ensuring health and wellbeing (Sikiru et al., 2023), SDG 4 - Promoting quality education (Cutler & Lleras-Muney, 2006), SDG 5 Achieving gender equality (Sen, Östlin, & George, 2007), SDG 8 - Encouraging decent work and economic growth (Bloom & Canning, 2000), SDG 10 - Reduced inequalities (Marmot, 2005), SDG 11 - Fostering sustainable cities and communities (Rydin et al., 2012), and SDG 12 -Advocating for sustainable production and consumption(Jozkowiak et al., 2022).

The theoretical linkages highlight how PCOS P&M relate to SDGs, specifically focusing on the connections established by the associated targets and indicators. These hypothesized linkages can be characterized as: (1) PCOS P&M directly contributes to the SDG, (2) PCOS P&M have an indirect relationship. or (3) SDG directly contributes to PCOS P&M.

A systematic presentation of these of these theoretical linkages is presented in the table 1: Relevance of PCOS to the Sustainable Development Goals and the type of linkages.

Table 1   Relevance of PCOS to the Sustainable Development Goals and the type of linkages.

Sustainable Development Goal.	Hypothesized linkage to PCOS	Type of link
SDG 1 - Reducing poverty	Out-of-pocket expenses related to PCOS diagnosis, treatment, and the management of its long-term comorbidities can push families into financial distress or poverty. Conversely, poverty may limit the accessibility and affordability of proper diagnosis, treatment, and management of PCOS.	1,3
SDG 2 - Zero hunger	PCOS can induce malnutrition through mechanisms like hidden hunger and iron-deficient anemia. At the same time, undernourishment and a lack of access to nutritious and safe food can increase the risk of PCOS.	1,3
SDG 3 - Health and well-being	PCOS plays a significant role in increasing the mortality rate due to cardiovascular diseases, cancers, diabetes, or chronic respiratory diseases. Furthermore, PCOS also increases the risk of mental health issues like depression, anxiety, eating disorders, and emotional distress. There is also a prevailing lack of accessibility and affordability concerning essential healthcare services for PCOS diagnosis and management.	1,3

SDG 4 - Education	Comprehensive and quality education may bolster knowledge and awareness about PCOS, potentially leading to earlier diagnosis, better management, and broader societal understanding.	2
SDG 5 - Gender equality	The absence of robust policies on PCOS at various levels can lead to gender-specific biases in medical care, emphasizing the need for gender-equitable health policies and legislation to ensure fair outcomes for women with PCOS.	3, 2
SDG 8 - Decent work and economic growth	The loss of Quality-Adjusted Life Years (QALY) due to chronic illnesses such as PCOS can negatively influence the work productivity and wages.	3
SDG 10 - Reduced inequalities	The absence of effective prevention and management for PCOS can exacerbate existing inequalities, especially among populations facing substantial barriers such as individuals with disabilities and transgender people. Furthermore, economic disparities can heighten the unmet health needs of those with PCOS.	1,3
SDG 11 - Sustainable cities and communities	Access to safe, affordable, accessible transport systems can improve the accessibility of health care.	3
SDG 12 - Sustainable production and consumption	The absence of environmentally sound management of chemicals in air, water, and soil can increase the exposure to endocrine disruptors, subsequently heightening the risk of PCOS.	3

Some key linkages have been highlighted below to prevent the reiteration of the content in the table. PCOS can directly worsen poverty due to the out-of-pocket expenses associated with its diagnosis, treatment, and management of its long-term co-morbidities. At the same time, poverty can impede access to PCOS diagnosis, treatment, and management. Economic disparities might amplify the unaddressed health needs of those with PCOS, and without specific screening, prevention, and management initiatives for PCOS, economic inequalities could grow through various pathways.

Drawing on the Social Determinants of Health (SDOH) framework, the relationship between PCOS prevention and management (PCOS P&M) and the Sustainable Development Goals (SDGs) is illustrative of the profound interconnectedness between health and the socio-economic fabric of our societies. PCOS, as examined here, is deeply intertwined with not just the biological factors, but also with the social, economic, and environmental determinants that individuals encounter throughout their lives.

This comprehensive understanding underscores that addressing PCOS goes beyond clinical interventions—it necessitates a broader perspective that encompasses economic policies, educational opportunities, environmental safeguards, and social protections. By situating PCOS within the SDOH paradigm, it becomes evident that multi-sectoral strategies and policies are essential. Fostering healthier societies isn't just about direct healthcare measures but ensuring an environment where each individual, irrespective of their health condition, can thrive and contribute to the collective well-being.

NCD Mortality beyond SDGs

Indicator 3.4.1, under Goal 3, target 3.4, focuses on mortality attributed to four specific non-communicable diseases (NCD4): cardiovascular disease, cancer, diabetes, and chronic respiratory diseases. Notably, this indicator excludes diseases other than the NCD4 and also excludes deaths in individuals younger than 30 years or older than 70 years (Bennett et al., 2020).

Though PCOS isn't directly encompassed in this metric, its implications on NCD4 are profound, as depicted in Figure 2. Studies have shown that women with PCOS are twice as likely to experience a cardiovascular event (Scicchitano et al., 2012), four times more likely to develop type 2 diabetes (Rubin et al., 2017), and at a heightened risk of cancers such as endometrial, ovarian, and breast cancer (Springer, 2014). Furthermore, PCOS's long-term ramifications align with three out of the four diseases listed under NCD4. Research has also suggested that women with PCOS may be more susceptible to severe COVID-19 symptoms, possibly due to vitamin-D deficiencies (Kyrou. I et al., 2020), potentially adding chronic respiratory diseases to the list of concerns linked to PCOS.

Another key indicator under target 3.4 is 3.4.2, which addresses suicide mortality rates. Women diagnosed with PCOS are observed to have an elevated risk of mood disorders, including major depressive and dysthymic disorders, anxiety disorders, eating disorders, and generalized emotional distress (Barry, 2019). However, there's a glaring gap in dedicated research, monitoring, evaluation, and advocacy for PCOS patients. Compounding the concern, the national and state indicator framework, designed to gauge SDG progress in Indian states, have overlooked the significance of monitoring the epidemiological trajectory of PCOS, especially in the context of achieving Goal 3 and, more specifically, Target 3.4.
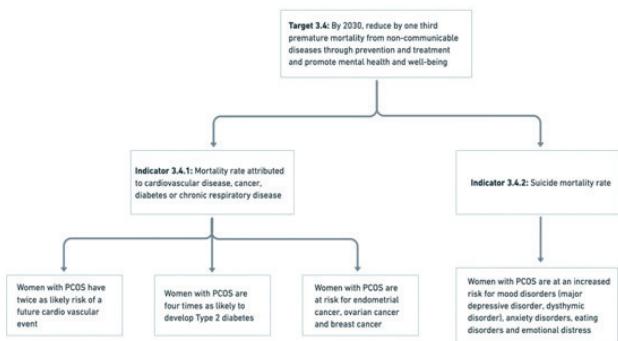
Figure 2 *Measures of PCOS within the existing NCD indicators.*

To achieve substantial progress on Target 3.4, which aims to "reduce by one-third premature mortality from NCDs through prevention and treatment by 2030, and promote mental health and well-being," it's essential to integrate policies for PCOS prevention and treatment. Specifically, we must monitor the incidences of cardiovascular disease, diabetes, and cancers (endometrial, ovarian, and breast) linked to PCOS. Furthermore, the mental well-being of women with PCOS should also be closely observed and addressed.

The complex relationship between PCOS and multiple non-communicable diseases underscores the necessity of comprehensive and inclusive health indicators. While the current framework of Target 3.4 within the SDGs emphasizes a subset of diseases, it inadvertently overlooks the broader health implications of conditions like PCOS. This oversight not only hinders accurate representation and understanding but may also impede effective interventions and policies aimed at overall well-being. By integrating the nuanced health challenges faced by women with PCOS into our global health targets, we can foster a more holistic and informed approach to health policy-making. This will not only serve the immediate population affected by PCOS but will also provide a model for how we address other overlooked conditions in global health metrics. As we advance towards 2030, it is paramount to ensure that our strategies are as comprehensive as the challenges they seek to address.

Linking Health Sector Priority Targets with PCOS

Establishing a clear link between SDG3 targets and PCOS is of utmost importance in public health. PCOS, a common endocrine disorder, affects various aspects of health, including reproductive, metabolic, and mental well-being. By clarifying how PCOS overlaps with SDG3 objectives, we can raise its standing in global health priorities, spark more research, and encourage interdisciplinary teamwork to tackle the diverse challenges it presents.

In the exploration of the relationship between SDG3 targets and PCOS, the methodology of expert elicitation was employed. The choice of this approach was motivated by ne significant factor was the noticeable lack of unified data detailing the ties between SDG3 aims and PCOS. The expertise of specialists, accessible through expert elicitation, acts as a valuable asset to navigate this data void.

A twelve-member expert committee was tasked with evaluating each health sector target based on a predefined scale: 1- No direct relevance, 2- Indirect or minimal relevance 3- Moderate relevance, 4- Strong relevance, and 5- Direct and significant relevance. To ensure a robust and representative outcome, all the individual ratings were collated and a focus group discussion was led to reach a consensus on the relevance of each target to PCOS.

Table 2 presents the relevance ratings for each health-sector target concerning PCOS as assessed by the expert committee. Based on the evaluations, targets 3.1 Reduce maternal mortality, 3.2, End preventable deaths of children under 5, 3.4 Reduce premature mortality from non-communicable diseases, 3.7 Access to reproductive

health-care services, 3.8 Universal health coverage, 3.b Support R&D of vaccines and medicines, and 3.c Increase health financing and workforce training emerged as priority targets warranting focused attention in relation to PCOS.

Table 2   Health-sector Targets and the PCOS Relevance Rating

Health Sector Targets	PCOS Relevance Rating
3.1 Reduce maternal mortality	4 - PCOS can directly impact pregnancy complications.
3.2 End preventable deaths of children under 5	3 - PCOS complications might affect neonatal health.
3.3 End specific epidemics	2 - General health management for PCOS patients might affect this indirectly.
3.4 Reduce premature mortality from non-communicable diseases	5 - PCOS is directly linked with many non-communicable diseases.
3.5 Strengthen prevention/treatment of substance abuse	2 - Mental health challenges from PCOS might lead to substance abuse.
3.6 Halve deaths from road accidents	1 - No direct relation with PCOS.
3.7 Access to reproductive health-care services	5 - PCOS is one of the primary reproductive health concerns.
3.8 Universal health coverage	5 - PCOS diagnosis, treatment, and management require comprehensive healthcare access.
3.9 Reduce deaths from pollution	2 - Environmental factors might influence PCOS indirectly.
3.a Implement WHO Framework on Tobacco	2 - Tobacco might exacerbate PCOS-related risks.
3.b Support R&D of vaccines and medicines	4 - Research can lead to better PCOS treatments.
3.c Increase health financing and workforce training	3 - Better health infrastructure can improve PCOS care.
3.d Strengthen global health risk management	2 - Early diagnosis and management of PCOS might be improved.

The Figure 3 showcases a radar chart provides a visual representation of the relevance ratings for each priority health-sector target in relation to PCOS. Each axis of the chart corresponds to a specific health-sector target, with the radial magnitude representing the assessed relevance rating, ranging from 1 (No direct relevance) to 5 (Direct and significant relevance).

Recognizing priority targets provides a clear path for those in policy-making, clinical practice, and research domains. It will not only enrich the discourse around women's health but also foster a more integrative approach, marrying the goals of global health advancement with the specificities of PCOS management.
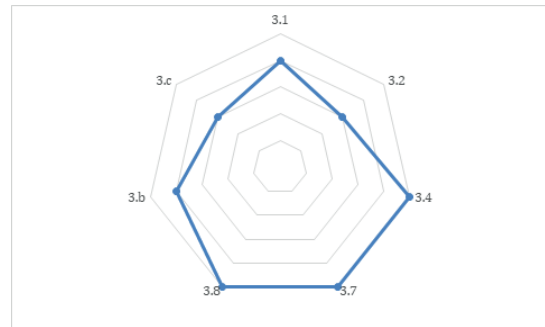
Figure 3   *PCOS Relevance Rating for Priority Health Targets*

Conclusion

Given the growing prevalence and incidence of PCOS in conjunction with India's designation as the diabetic capital of the world, the country is facing an amplified risk of metabolic non-communicable diseases. These are characterized by specific metabolic risk indicators such as elevated blood pressure, obesity, hyperglycaemia, hyperlipidaemia, and modifiable behavioural risk contributors like sedentary lifestyles, unhealthy diets, hidden hunger, and harmful alcohol consumption.

The ABHIYAAN PCOS initiative seeks to evaluate these prevailing circumstances concerning PCOS in India, considering the nation's unique socio-cultural implications, economic ramifications, and its diverse healthcare system. Initial findings from the ABHIYAAN PCOS study suggest a trajectory of learning. Yet, the "One Nation-One Healthcare" proposition by the NITI Aayog presents both a challenge and an opportunity for advanced multidisciplinary, multispecialty and multisystem management of PCOS.

In the backdrop of PCOS as the silent epidemic, fostering collaborations between governmental and non-governmental sectors is essential. While international initiatives can provide valuable insights, they should complement rather than overshadow national collaborations. Transposing guidelines from one nation

to another without taking into account local nuances is counterproductive.

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Gender Wage Gap and Gender Work Inequality in India

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Abstract

This study attempts to find how gender inequality in wages influences the inequality in gender work division within households. While the gender wage gap is falling, there is continuous fall in female labour market participation, rather than rising, which is a puzzling situation. This study has tried to explain this puzzling situation using Periodic Labour Force Survey (2018-19) and Time Use Survey (2019). Inequality in wages have been considered in terms of gender wage gap. Using fractional regression analysis, we find that gender wage gap positively influences the paid work participation for both males and females. Simultaneously, it causes a fall in unpaid work activities, such as care work. For females, the impact is more strong implying that own income effect is stronger than substitution effect of wages, while for males, the substitution effect is stronger. The males switch their time from domestic and care work to paid work when wage gap rises. But females switch time from care work and own production work to paid work when wage gap rises. The study ends with recommendation of policies such as incentives and benefits for working women which will increase the substitution effect of wages for the females and induce them into the labour market.

Keywords: Gender wage gap, Labour Market Participation, Unpaid Work, Time Use

Introduction

There is large inequality existing in labour market participation between men and women in the labour market. Whereas 36.32 per cent men were involved in paid work, 23.6 per cent of women were engaged in paid work according to Periodic Labour Force Survey of India (2019). Moreover, the International Labour Organisation (ILO) in 2014 reported a puzzling trend where female labour force participation rate in India is seen declining from 34.1 per cent in 1999-00 to 27.2 per cent in 2011-12. The reasons suggested include rising educational enrolment and household income effect as the causes for the declining trend. While there has indeed been improvement in access to education for females, especially in rural areas, studies have also found a simultaneous rise of per cent of females engaged in domestic work in India (Singh and Pattanaik, 2020). This implies that females are switching from paid work outside household to unpaid domestic work within household. Some studies have also pointed to a phenomenon of housework penalty where due to burden of housework, females are unable to participate in paid work (Bryan and Sevilla-Sanz, 2011; Powell and Craig, 2015; Kizilirmak and Memis, 2019). Another reason forwarded is the negative impact of household income effect on female labour force participation. Due to the secondary earning status given to females, they get involved in paid work when the household is suffering from income deficit and withdraw when the household is economically better-off (Utomo, 2012). Given the economic growth experienced by the country in recent years, there has been improvement in wages in the labour market (Sharma, 2022). This, in turn, has led to a rise in household income which has reduced the need for women in the family to seek paid work outside. This has caused a rise in unpaid work while simultaneously reduces their participation in paid work.

Another reason forwarded is wage discrimination in the labour market. While unpaid work and its gender dimension have widely been discussed in literature, an important aspect linking the two is labour market characteristics, such as gender discrimination, prevailing in the region, which is often overlooked. Gender wage

gap in India, where workers are paid unequal wages based on their gender, is explained primarily by gender discrimination (Mondal, Ghosh, Chakraborty, and Mitra, 2018). Becker (1965) argued that the wage discrimination in the labour market causes households to allocate paid work to males since they receive better remuneration than the females. This forces the females to allocate their time to household work, since the male members assumes the role of primary earners in the household. While there is presence of considerable wage gap between male and female workers in the labour market in India, where females earn 19 per cent less than the males, yet studies have shown the gap has narrowed considerably in recent years (International Labour Organisation, 2022). According to Becker's (1965), this should induce females to enter the labour market rather than force them to leave. Our study attempts to explain this puzzling phenomenon.

This study attempts to find how wage discrimination influences the male and female members in the households. This will be the focus of this study where we shall attempt to find how the wage gap associates differently with paid and different components of unpaid work of males and females and make a comparative analysis between them. The study hypothesises that wage is an important reason which explains why individuals working in different industries chooses to devote different amounts of time to unpaid work. This is because, a critical aspect of any job is the remuneration received by individuals for the work they put in. Wage rate is therefore an important aspect taken into consideration by individuals while allocating time in various activities. The study finds evidence that wage is a significant determinant of time devoted to paid work. Since as wage rises, the opportunity cost of not working rises, individuals devote more time to paid work. Therefore, paid work time and wage rate per hour are directly related. However, unpaid work time and wage rate are inversely related. Since time is scarce for every individual, devoting more time to paid work has a detrimental impact on time devoted to unpaid work, which falls. Therefore, with rise of wages, unpaid work is substituted for paid work. However, Becker's study failed to consider the different components of unpaid household work and how it gets impacted by wage gap prevailing in the labour market. This study will also attempt to analyse the impact on different components of unpaid work.

Methodology

In order to measure wage gap, we require data on wages in the labour market. We use wage data from NSS Periodic Labour Force Survey (PLFS) (2018-19) which provides detailed information about labour market outcomes at household level. We take the industry wide average per hour wages at the district level, after consideration of status of employment. For calculation of gender wage gap, we have considered the following expression which is related to the relative wage gap measure proposed by OECD (2023):

Gender Wage gap = (Wage for males-Wage of females)/ Wage for male

While the PLFS data collects information on domestic work and allied activities, it fails to capture the different components of unpaid work. Due to this, we consider the Time Use Survey data (2019) for the study. The Time Use Survey data provides detailed information about the amount of time spent by individuals in different activities on the day before the survey. Therefore, it not only helps to capture the paid work, but also the unpaid work activities. Unpaid work is not transacted in the market and so it is not possible to measure its value in monetary terms. Time Use data helps to solve this issue by helping to capture the value placed by individuals on unpaid work activities based on their decisions to spent time on such activities. Therefore, time use data helps to make visible the unpaid work activities which takes place within the confines of households. This is useful to measure the contribution of women to the economy since they bear a greater portion of the unpaid work activities.

We consider work performed by an individual as consisting of two types of activities: paid work and unpaid work. Paid work consists of those activities performed in the labour market due to which they receive remuneration. In TUS (2019), we consider codes 110 to 182 as paid work, which also includes self-employment work. However, it excludes the time spent in seeking employment. Unpaid work consists of those activities which do not get any monetary return since it is not transacted in the market place. It can be further divided into the following three types:

1. Domestic work- This activity consists of time spent in providing at-home services for the family, such as cooking and cleaning. Therefore, all activity codes between 301 and 400 fall under this category.

2. Care work- Care provided by individuals are provided to the entire family. All these activities are not remunerated and therefore, fall under unpaid work. Activities which have codes between 401 and 500 fall in this category.

3. Own production- The time taken to produce goods for final use at home are considered under this category. Since these products are not marketed, their valuation is not possible. Therefore, when individuals spend time in production of such goods at home, it is unpaid work, as it is unremunerated.

Example of such activities are time spent in collecting water and fuel for household use. Such activities take place when the households cannot afford to buy the market substitutable of these products. The TUS activity codes which capture these activities are coded from 201 to 300.

The objective of this study is to find the association of gender wage gap on division of paid and unpaid work between male and female members in households. Therefore, we use the estimation of following regression model for analysis:

$Y_{1,j}$ = *Intercept* + β_1* *Gender Wage Gap* + β_2* *Logarithm of Monthly Consumption Expenditure* + β_3 **Number of children (0-5 years)*+ β_4**No. of male children (6-13 years)*+ β_5**No. of female children (6-13 years)*+ β_6**No. of male adolescents (14-17 years)*+ β_7**No. of female adolescents (14-17 years)* + β_8* *Household Size* + β_9* *Dummy for General Caste*+ β_{10}* *Dummy for Hindu* + β_{11}* *Dummy for Urban Sector* + β_{12}**Dummy for Married* + β_{13}**Dummy for Beyond Secondary Education* + β_{13} * *Age* + β_{14}* *Age Squared* + $\varepsilon_{1,j}$ (1)

The dependent variable is the proportion of time in a day (in minutes) that the individual spends in a day on the activity out of a total of 1440 minutes in a day. The dependent variable therefore lies between 0 and 1, and so we use fractional regression estimation. The equation (1) has been separately calculated for each of the following activities: paid work, unpaid work and its three components: domestic work, care work and own production work. The independent variable Gender Wage Gap is the variable of interest for this study. The other independent variables included in equation (1) are control variables, which may influence the nature of relation between proportion of time spent in an activity and gender wage gap. The logarithm of monthly consumption expenditure has been taken as control since it indicates the economic condition of household which may influence the individual's decision of time allocation, and so it has been controlled for. Variables pertaining to the composition of household such as number of children, the gender of adolescent members and the household size will influence the decision of individuals while allocating time to different activities (Gupta, 1999; Rego, 2021). Variable such as the social group and religion of household which captures the cultural influence are also important (Das and Desai, 2003). Individual level factors such as marriage is found to reduce the paid work time for females and unpaid work time for males (Majumdar, 2011). Other factors such as education, age and age-square are also significantly influencing the time allocation of individuals (Singh and Pattanaik, 2018; Malathy, 1989; Dasgupta and Goldar, 2005).

Our analysis is only focused on individuals who fulfil the following criteria:

- age group is between 18 to 64 years (working age group)
- households whose surveyed day was characterised as "normal day" which means the day's schedule was not non-normal
- with no missing values for all the key variables that has been used for the analysis.

Results and Discussions

It is important to understand how gender wage gap is influencing the decision of male members in households in dividing their time between paid and unpaid work. We find in Table 1 (in Appendix) that gender wage gap is increasing the proportion of time devoted to paid work by the male members, as it has a positive significant coefficient of 0.018 proportion. This increase is independent of household income effect, since we have controlled for monthly consumption expenditure. This shows that a rise of gender wage gap induces the male members to devote more time to paid work and less time to unpaid work. When males are being paid more than females in the labour market, they devote more time to paid work which ultimately reduces their time of unpaid work activities, which falls by 0.033 proportion. The unpaid work which suffers is care work and domestic work, which significantly falls by 0.045 and 0.03 proportion respectively. This shows the pure impact of wage discrimination in the labour market on the time use decisions of males in a household.

Table 2 (in Appendix) shows the association of gender wage gap on the time use of female members. Contrary to Becker (1965), we find gender wage gap induces females to devote more time to paid work in India, since the coefficient of gender wage gap is significantly positive (=0.045). From the definition of gender wage gap, we find that a higher gap implies females are being paid lesser per hour than their male counterparts in the same industry and status of employment. A higher wage gap indicates a greater wage discrimination which Becker (1965) pointed would discourage females and reduce their participation in the labour market. However, Table 2 shows that wage discrimination is associated with more time devoted to paid work in a day by the females, due to reasons other than household income effect. Given the more time devoted to paid work, the females choose to engage les in unpaid work activities, which significantly falls by 0.055 proportion. When we consider the component of unpaid work which suffers, we find

that it is mostly care work which falls by 0.235 proportion while own production falls by 0.161 proportion. So, due to gender wage discrimination, females substitute the time in acer work and own production work for paid work activities.

If we compare the results of males and females, then the impact of gender wage gap is more for females than males. It increases the paid work time proportion for females by a greater magnitude than that of males. As a result, unpaid work falls by greater proportion for females in the form of care work and own production work. Their domestic work remains unaffected which implies they continue to devote same time to domestic work activities.

When we consider the control variables, we find that presence of children in households increases the proportion of time devoted to unpaid work at the cost of paid work, though the impact is more for females. Larger household size increases the paid work time for females since they take up jobs to sustain the more members in the family. Cultural factors such as religion and social group are also significant for females more than males. Presence of the household in urban area considerably increases paid work for both while reducing their time for unpaid work in the form of own production work. Being a household head increases the burden of unpaid work, while for females it also increases paid work burden. Being married causes males, whose unpaid work falls at the cost of paid work, while for females their unpaid work rises, though paid work is insignificantly affected. Age has positive impact on paid work time proportion for females while increasing their domestic and care work time also. For males, the impact of age in significant on unpaid work components whose time rises with rise of age.

Conclusion

While inequality of wages in the labour market has been studied widely in literature, there have been few attempts to find the nature of association between inequality of wages and inequality in labour market participation based on gender. This study attempts to explain how gender wage gap in the labour market influences males and females differently in their decisions to allocate time. Like wages, gender wage gap can be said to have two off-setting impact on individuals: substitution effect and own income effect. For males, we can say that substitution effect is stronger since as their relative wages are improving, they are switching more time from unpaid work activities (such as domestic work and care work) to paid work activities. Since females

have secondary earner status in households, they work only when there is income deficit. When wage gap is high, it implies that the gap between male and female wages are more, where females are getting lower wages. This forces them to devote more time to paid work to earn the same income. When the gap between the male and female wages becomes lower, female wages are rising at a greater rate than male wages. This allows them to spend less time in paid work to compensate for the household income deficit and devote more time to unpaid work such as care work. Therefore, for females, the direct relation between gender wage gap and labour market participation can be summarized as due to two factors: stronger own income effect and secondary earner status accorded to females. To improve the labour market participation of women, there should be attempts to increases the substitution effect of wages for females through incentives and special benefits in work places for working females. There should also be attempts to increase access to time-saving technologies which will reduce the time for unpaid work which ties women inside the household. Facilities such as creches in the work place will encourage mothers to take up more jobs in the labour market. This will help to increase the substitution effect of female wages on their labour market participation which will increase.

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Appendix

Table 1 Weighted fractional regression results for proportion of time use by males in different components of work

Variables	Paid work	Unpaid work	Domestic work	Care work	Own Production
Gender wage gap	0.018***	-0.033***	-0.030***	-0.045***	-0.011
	(0.003)	(0.008)	(0.010)	(0.009)	(0.017)
Logarithm of Monthly Consumption Expenditure	0.039***	-0.051***	-0.065***	0.073***	-0.095***
	(0.003)	(0.009)	(0.009)	(0.010)	(0.019)
Number of children (0-5 years)	-0.005**	0.172***	0.068***	0.284***	0.048***
	(0.002)	(0.006)	(0.007)	(0.006)	(0.013)
No. of male children (6-13 years)	0.005*	0.080***	0.071***	0.105***	0.036**
	(0.003)	(0.008)	(0.009)	(0.008)	(0.015)
No. of female children (6-13 years)	0.006**	0.021***	0.024**	0.055***	-0.019
	(0.003)	(0.008)	(0.010)	(0.009)	(0.016)
No. of male adolescents (14-17 years)	-0.004	0.026**	0.033***	-0.012	0.016
	(0.004)	(0.012)	(0.012)	(0.015)	(0.023)
No. of female adolescents (14-17 years)	-0.002	0.047***	0.043***	-0.086***	0.091***
	(0.004)	(0.012)	(0.014)	(0.017)	(0.021)
Household size	-0.001	-0.071***	-0.079***	-0.067***	-0.013
	(0.002)	(0.005)	(0.006)	(0.005)	(0.008)
General Caste=1	-0.005	0.084***	0.102***	0.040***	0.055***
	(0.004)	(0.009)	(0.010)	(0.011)	(0.021)
Hindu=1	0.017***	0.064***	0.048***	0.066***	0.068***
	(0.003)	(0.009)	(0.010)	(0.010)	(0.020)
Urban sector=1	0.037***	-0.171***	-0.100***	-0.053***	-0.382***
	(0.003)	(0.008)	(0.009)	(0.009)	(0.021)

Household head=1	0.004	0.065***	0.087***	0.035**	0.037
	(0.005)	(0.013)	(0.016)	(0.015)	(0.025)
Married=1	0.015***	-0.087***	-0.269***	0.384***	0.031
	(0.005)	(0.012)	(0.014)	(0.023)	(0.024)
Beyond secondary education=1	-0.013***	-0.017	-0.019	0.013	-0.029
	(0.005)	(0.013)	(0.015)	(0.014)	(0.029)
Age	0.001	0.013***	0.026***	0.018***	-0.008*
	(0.001)	(0.002)	(0.003)	(0.004)	(0.005)
Age squared	-0.000*	-0.000***	-0.000***	-0.000***	0.000***
	0.00	0.00	0.00	0.00	0.00
Constant	-0.813***	-1.515***	-1.757***	-3.554***	-1.543***
	(0.032)	(0.082)	(0.088)	(0.098)	(0.173)
Observations	12,167	12,167	12,167	12,167	12,167
R-squared	0.000399	0.0184	0.0188	0.0763	0.0254
Source: Author's calculations					
Figure in parentheses are standard errors					

Table 2 Weighted fractional regression results for proportion of time use by females in different components of work

Variables	Paid work	Unpaid work	Domestic work	Care work	Own Production
Gender wage gap	0.045**	-0.055***	-0.013	-0.235***	-0.161***
	(0.019)	(0.019)	(0.019)	(0.050)	(0.052)
Logarithm of Monthly Consumption Expenditure	0.002	-0.031*	-0.027**	0.194***	-0.162***
	(0.017)	(0.016)	(0.013)	(0.042)	(0.044)
Number of children (0-5 years)	-0.075***	0.095***	0.047***	0.390***	-0.099**
	(0.017)	(0.016)	(0.013)	(0.032)	(0.048)
No. of male children (6-13 years)	-0.019	0.071***	0.080***	-0.011	0.013
	(0.017)	(0.015)	(0.015)	(0.047)	(0.048)
No. of female children (6-13 years)	-0.003	0.042***	0.063***	0.035	-0.094*
	(0.015)	(0.014)	(0.014)	(0.039)	(0.053)
No. of male adolescents (14-17 years)	0.016	0.063***	0.089***	0.101*	-0.195***
	(0.020)	(0.019)	(0.019)	(0.052)	(0.064)
No. of female adolescents (14-17 years)	-0.026	0.013	0.054**	-0.252***	-0.176**
	(0.021)	(0.024)	(0.022)	(0.069)	(0.071)
Household size	0.021***	-0.061***	-0.063***	-0.061***	0.021
	(0.008)	(0.008)	(0.008)	(0.019)	(0.024)

General Caste=1	0.035*	-0.060**	-0.037	-0.152**	-0.082
	(0.020)	(0.024)	(0.023)	(0.075)	(0.077)
Hindu=1	0.101***	-0.052**	-0.012	-0.320***	0.029
	(0.027)	(0.026)	(0.021)	(0.055)	(0.069)
Urban sector=1	0.077***	-0.066***	-0.029**	0.070*	-0.418***
	(0.016)	(0.015)	(0.013)	(0.042)	(0.064)
Household head=1	0.048*	0.119***	0.138***	0.027	-0.094
	(0.027)	(0.029)	(0.024)	(0.060)	(0.084)
Married=1	-0.013	0.318***	0.313***	0.364***	0.011
	(0.022)	(0.026)	(0.022)	(0.064)	(0.069)
Beyond secondary education=1	-0.023	-0.052	-0.043	0.176*	-0.606***
	(0.036)	(0.038)	(0.035)	(0.094)	(0.187)
Age	0.011**	0.002	0.014***	-0.093***	0.015
	(0.005)	(0.005)	(0.004)	(0.010)	(0.014)
Age squared	-0.000***	0	-0.000***	0.001***	0
	0.00	0.00	0.00	0.00	0.00
Constant	-0.943***	-0.742***	-1.202***	-2.128***	-0.812**
	(0.160)	(0.147)	(0.130)	(0.373)	(0.378)
Observations	676	676	676	676	676
R-squared	0.00274	0.0112	0.0102	0.139	0.037

Source: Author's calculations

Figure in parentheses are standard errors

Transcending Barriers: Empowering Transgender Communities for Sustainable Development in India

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Abstract

In India, the transgender community has long battled discrimination, stigma, and exclusion from mainstream society. This article, titled "Transcending Barriers: Empowering Transgender Communities for Sustainable Development in India," explores the challenges faced by transgender individuals and the critical role of empowerment in advancing sustainable development. The legal landscape for transgender rights in India, as embodied by the Transgender Persons (Protection of Rights) Act, 2019, is examined, highlighting the necessity for continued improvements to ensure comprehensive protection. Discrimination and healthcare disparities within the community are addressed, emphasizing the vital importance of transgender-friendly healthcare services for overall well-being. Initiatives fostering inclusive education and employment opportunities are showcased as drivers of economic sustainability, as these not only provide livelihoods but also reduce dependency on social welfare. A core focus is placed on reducing social stigma and discrimination, for it is only through the dismantling of these barriers that sustainable development can be achieved. Success stories of community-driven initiatives are highlighted, showcasing how grassroots efforts contribute to broader societal transformation. Therefore, based on the secondary sources, the article delves into the intersectionality of transgender issues with factors like caste, class, and regional disparities, emphasizing the need to address these complexities in sustainable development endeavors. In conclusion, this article emphasizes the imperative of empowering transgender communities in India as an integral part of sustainable development. It calls for ongoing efforts, collaboration, and the removal of institutional and societal barriers to foster an inclusive, equitable, and sustainable future for all.

Keywords: Discrimination, Empowerment, Exclusion, Stigma, Sustainable Development, Transgender

Introduction

Transgender individuals are part of the LGBTQ+ community, which includes Lesbian, Gay, Bisexual, and Transgender people, among others. Transgender individuals comprise a relatively small portion of the population in every country, and tragically, they have faced neglect and underdevelopment throughout history. For a long time, this group has been subjected to bias and injustice. They regularly encounter challenges in getting basic rights and opportunities. Thetransgender community faces profound and systemic challenges across various aspects of life, encompassing social, economic, and political domains. These challenges are rooted in deeply ingrained societal biases and discrimination. Sustainable development of a country hinges on the progress and inclusion of all its citizens, including transgender individuals. Gender equality discussions often prioritize achieving parity between men and women while overlooking the rights and needs of marginalized groups within the gender spectrum. To achieve sustainable development, it is essential to eliminate gender inequality and promote the development of marginalized communities. A country can never sustain its development unless that development is inclusive. Empowering transgender individuals is essential because it reduces unfairness in society, helps them find jobs and be part of the economy, brings people together, gives them access to healthcare, includes diverse perspectives, and lets them participate

in politics. This benefits everyone and aligns with global goals for a better world (Loh, 2018).

After World War II, the concept of sustainable development gained prominence, driven by growing environmental awareness. The concept of sustainable development was first recognized internationally in 1972 at the UN Conference on the Human Environment in Stockholm. It gained broader popularity and recognition with the Brundtland Report in 1987 and further at the Rio summit in 1992. It defines sustainable development as "a development that meets the needs of the present without compromising the ability of future generations to meet their own needs". The Stockholm Conference in 1972 and the Brundtland Commission's report in 1987 played pivotal roles in shaping the concept of sustainable development. Yet, it wasn't until the Rio Summit in 1992 that global leaders jointly recognized sustainable development as the foremost global challenge it remains today. In the aftermath, global sustainability has become a critical aspect of the development agenda for many nations. In line with this, in 2015, the United Nations General Assembly (UNGA) introduced Agenda 2030, known as the Sustainable Development Goals (SDGs). This marked a significant advancement from the Millennium Development Goals (MDGs) set at the Rio summit. Comprising 17 goals and 169 targets, the SDGs offer a comprehensive framework for global development, encompassing environmental preservation, social equity, economic growth, political stability, health, and more. One of the overarching objectives of the SDGs (2015-2030) is the comprehensive development of all individuals, including those who are marginalized, overlooked, or underserved. This also encompasses gender-diverse communities, with a particular emphasis on addressing the needs of women and LGBTQI individuals who often face marginalization and discrimination (Bevilacqua, 2022).

Among the 17 goals, goal number 5 primarily focuses on promoting gender equality, yet it may not explicitly mention the transgender community. However, some of these goals and targets indirectly allude to the inclusion and recognition of the transgender community within the SDGs. Also the 2030 Agenda for the Sustainable Development Goals (SDGs) embody a powerful Commitment to "Leave No One Behind" and ensuring a life of dignity for all including Lesbian, Gay, Bisexual, Transgender, and Intersex (LGBTQ) people (UNDP India, 2021). As a result, empowering the transgender community and protecting their rights, while ensuring access to justice, holds profound significance within the context of "Transforming our world: the 2030 Agenda for Sustainable Development (Lal, 1999)."

Understanding the Transgender Community in India

The transgender community is made up of various groups, including Hijras, eunuchs, Kothis, Aravanis, Jogappas, Napumsaka, Shiv-Shakthis, and more. The transgender community has a rich history in India and has been an integral part of Hindu mythology for centuries. Eunuchs have existed since 9th century BC. References to transgender individuals can indeed be found in various ancient Indian texts, including the Vedas, Mahabharata, Ramayana, Manusmriti, Puranas, and even in the Kamasutra, highlighting the historical acknowledgment of diverse gender identities in India. This rich historical backdrop emphasizes that the presence of the transgender community in India has roots in various religious and non-religious texts, especially in Hinduism. But these references are not limited to Hinduism alone; they can also be traced in Jainism and Buddhism, underscoring the recognition of diverse gender identities in multiple ancient Indian religious traditions. During medieval times, Hijras held vital positions in state affairs. They served as political advisors, administrators, and harem guardians in Islamic courts under Mughal and Ottoman rule, exerting substantial influence on state matters (Lal, 1999).

At the early British colonial era, the transgender community held some rights and respect. However, in the latter half of the 19th century, the British administration actively pursued the criminalization of the Hijra community, eroding their civil rights and diminishing their status. During colonial rule, Hijras were categorized as distinct castes or tribes across India. The Criminal Tribes Act of 1871 targeted Hijras involved in activities like kidnapping, castrating children and public dancing in female attire. Penalties included imprisonment and fines. However, this act Act was repealed in 1952. But its historical legacy still impacts the vulnerable position of Hijras today.

Even after the post-independence period, in India, the status of transgender does not improve much. The society and the government did not show such a positive attitude. For example, we can talk about the Karnataka police act 1964, with the help of this act; the Karnataka government took the power to regulate the transgender. Due to the lack of adequate recognition and support from both the government and society, many Hijras struggle to secure respectable livelihoods. Consequently, begging and extortion often become their primary means of income, with some individuals resorting to sex work as a profession. Additionally, many Hijras experience neglect from their own families, exacerbating the challenges they face. Despite recent government initiatives to improve the welfare of the Hijra community in India, such measures, while commendable, remain insufficient in addressing

the myriad challenges they face. Comprehensive support is essential for lasting change (Lal, 1999).

The transgender community constitutes a relatively small portion of the global population, andthis holds true within the context of India as well. In post-independence India, the transgender community was historically excluded from census data. This changed in 2011 census report, when comprehensive information on transgender individuals, including employment, literacy, and caste, was collected. According to the 2011 Census, the transgender population in India was documented at 4, 87,803 individuals. The census revealed that Uttar Pradesh (UP) had the largest transgender population with 1, 37,465 individuals, while Lakshadweep had the smallest representation, with only 2 transgender persons. The transgender population is notably higher in certain states, with Uttar Pradesh (28.18%), Andhra Pradesh (8.97%), Bihar (8.37%), WestBengal (6.22%), and Tamil Nadu (4.58%) showing substantial representation (Srivastava, 2014).

The legal and social status of the transgender community in India has been a subject of ongoing development and change.

Legal Status

NALSA Judgment (2014): The Supreme Court of India, in the National Legal Services Authority (NALSA) v. Union of India judgment in 2014, recognized transgender people as a third gender and affirmed their right to equality and non-discrimination.

Rights and Entitlements: Transgender persons are entitled to all rights under the law, including the right to education, employment, healthcare, and the right to vote.

Criminalization of Discrimination: Discrimination against transgender individuals is criminalized under various laws, and they are protected from harassment and violence.

Transgender Persons (Protection of Rights) Act, 2019: The Transgender Persons (Protection of Rights) Act was passed in 2019 to protect the rights of transgender persons. However, the Act faced criticism from activists who argued that certain provisions were regressive and did not adequately address the concerns of the transgender community (Jos, 2017).

Reservation in Education and Employment: Some states in India have introduced reservation policies for transgender individuals in education and public sector employment.

Social Status

Stigma and Discrimination: Despite legal advancements, transgender individuals in India may still face stigma, discrimination, and marginalization in various aspects of life, including education, employment, and healthcare.

Social Acceptance: There has been a gradual increase in awareness and acceptance of transgender individuals in Indian society. However, challenges persist, and efforts are ongoing to promote inclusivity and understanding.

Community Organizations: Various community-based organizations and NGOs are working to empower and support the transgender community, providing resources, advocacy, and healthcare services.

Media Representation: Representation of transgender individuals in media and popular culture has increased, contributing to a more nuanced understanding of transgender issues.

Barriers to Sustainable Development

Empowering transgender communities for sustainable development in India faces several barriers, including societal, economic, legal, and healthcare challenges. Here are some key barriers:

Social Stigma and Discrimination: Transgender individuals often face deep-seated social stigma and discrimination, leading to exclusion from mainstream society. Discrimination in education, employment, and healthcare further marginalizes transgender people, limiting their opportunities for personal and professional development.

Lack of Legal Recognition: Inconsistent legal recognition of transgender individuals exacerbates their vulnerability. While India has made strides with the Transgender Persons (Protection of Rights) Act, 2019, implementation challenges and gaps remain.

Limited Educational Opportunities: Discrimination in educational institutions can result in high dropout rates among transgender students. Lack of awareness and sensitivity among educators often leads to a hostile environment, hindering the academic growth of transgender individuals.

Employment Discrimination: Transgender individuals often face discrimination in the workplace, limiting their access to employment opportunities. Lack of inclusive policies and awareness among employers can contribute to high rates of unemployment or underemployment within the transgender community.

Healthcare Disparities: Limited access to transgender-friendly healthcare services poses a significant barrier to the well-being of transgender individuals. Stigmatization

within healthcare systems may discourage transgender individuals from seeking necessary medical care, including gender-affirming treatments.

Economic Vulnerability: Discrimination and lack of employment opportunities contribute to economic vulnerability within the transgender community. Transgender individuals may resort to informal and precarious employment, further perpetuating poverty and financial instability.

Lack of Social Support: The absence of family and social support networks can leave transgender individuals vulnerable, impacting their mental health and overall well-being. Community-based support systems are crucial for empowerment and sustainable development.

Violence and Harassment: High levels of violence, including physical and verbal abuse, against transgender individuals contribute to their marginalization. Fear of violence can limit mobility and participation in various aspects of public life.

Inadequate Data and Research: Limited data on the transgender population hampers the development and implementation of targeted policies and programs. Adequate research is necessary to understand the specific challenges faced by the transgender community in different regions of India.

Addressing these barriers requires a comprehensive approach, including legal reforms, educational initiatives, employment policies, healthcare reforms, and efforts to change societal attitudes and perceptions towards transgender individuals. Community involvement and collaboration with advocacy groups are essential for creating an inclusive and supportive environment for transgender communities in India (Semmalar, 2014).

Empowering Transgender Communities

Empowering transgender communities in India involves addressing various aspects such as social, economic, and legal challenges. Here are some steps that can contribute to the empowerment of transgender communities:

Legal Recognition and Protection: Advocate for legal recognition of transgender individuals and their rights. Ensure protection from discrimination and violence through comprehensive anti-discrimination laws.

Access to Education: Promote inclusive education by creating a safe and supportive environment for transgender students. Develop educational materials that are inclusive of diverse gender identities and expressions.

Employment Opportunities: Encourage inclusive hiring practices in both public and private sectors.

Provide skill development and vocational training programs to enhance employability.

Healthcare Access: Ensure access to transgender-friendly healthcare services, including gender-affirming healthcare. Train healthcare professionals to be sensitive to the needs of transgender individuals.

Public Awareness and Sensitization: Conduct awareness campaigns to challenge stereotypes and reduce stigma. Implement training programs for various sectors (police, healthcare, education) to sensitize professionals about transgender issues.

Community Support and Networking: Facilitate the formation of support groups and community organizations. Foster networking opportunities for transgender individuals to share experiences and resources.

Legal Aid and Advocacy: Establish legal aid services to assist transgender individuals in cases of discrimination or human rights violations. Support advocacy groups working towards transgender rights.

Social Welfare Programs: Implement social welfare programs that specifically address the needs of transgender communities. Provide financial assistance and housing support to transgender individuals facing economic challenges.

Crisis Helplines and Mental Health Support: Establish crisis helplines to provide immediate support to transgender individuals facing violence or discrimination. Promote mental health awareness and provide access to mental health services.

Media Representation: Advocate for positive and accurate representation of transgender individuals in media. Challenge and counteract negative stereotypes through media campaigns.

Policy Reforms: Work towards policy reforms that recognize and address the unique challenges faced by transgender communities. Advocate for the inclusion of transgender issues in national and state-level policies (Dhanya & Thanuskodi, 2021).

Collaboration with NGOs and International Organizations: Collaborate with non-governmental organizations and international agencies to leverage resources and support for transgender empowerment initiatives.

It's important to note that these steps are interconnected, and a holistic approach involving collaboration between government, civil society, and the transgender community itself is essential for meaningful and sustainable change (Arora, Bhujang & Sivakami, 2021).

Initiatives and Challenges

Several initiatives have been undertaken in India to empower transgender communities, but it's important to note that challenges persist. Here are some successful initiatives and the challenges faced:

Successful Initiatives

Transgender Persons (Protection of Rights) Act, 2019: The enactment of this legislation aimed to protect the rights of transgender persons and prohibit discrimination. While there are critiques, it represents a step towards legal recognition and protection (Menon, 2009).

Kochi Metro Inclusive Policy: The Kochi Metro Rail Limited implemented an inclusive hiring policy, reserving jobs for transgender individuals. This initiative helps combat employment discrimination.

Transgender Support Centers: Some NGOs and community-based organizations have established support centers that provide a range of services, including legal aid, healthcare, skill development, and counseling.

Education Initiatives: NGOs and educational institutions have worked to create safe and inclusive spaces for transgender students. Some scholarships and support programs specifically target transgender individuals, promoting education and skill development.

Community Empowerment Programs: Various organizations conduct empowerment programs that focus on skill development, entrepreneurship and financial literacy for transgender individuals, helping them become economically self-sufficient (Reddy & Sen, 2013).

Transgender Representation in Politics: The election of transgender individuals to political offices in some states is a positive step towards representation and advocacy for transgender rights.

Challenges Faced

Implementation Gaps: Despite legal frameworks, the actual implementation of policies is often slow and faces challenges, leading to a gap between rights on paper and the lived experiences of transgender individuals.

Lack of Awareness: Widespread lack of awareness about transgender issues contributes to discrimination and exclusion. Many people hold misconceptions about transgender individuals, leading to social stigma.

Healthcare Disparities: Limited access to transgender-friendly healthcare services remains a challenge. Comprehensive healthcare, including gender-affirming treatments, is often inaccessible or misunderstood by healthcare providers.

Economic Marginalization: Employment discrimination and a lack of inclusive policies in the private sector contribute to economic vulnerability within the transgender community.

Violence and Harassment: Transgender individuals continue to face high levels of violence, both physical and verbal, which hinders their ability to live and work freely.

Stigma in Education: Discrimination in educational institutions persists, leading to high dropout rates among transgender students. Lack of awareness and sensitivity among educators remains a significant challenge.

Limited Data and Research: The lack of comprehensive data and research on transgender issues makes it challenging to design evidence-based policies and programs.

Social Support: Many transgender individuals lack familial and societal support, affecting their mental health and overall well-being.

Addressing these challenges requires continued efforts from the government, NGOs, and society at large to create an inclusive environment and eliminate discrimination against transgender individuals. Ongoing advocacy, awareness campaigns, and collaboration are essential for sustainable empowerment (Anuvinda & Siva, 2016).

Future Prospects and Sustainability

Empowering transgender communities in India requires a multifaceted approach that addresses social, economic, and legal aspects. Here are some potential future prospects and sustainability measures:

Legal Reforms: Advocate for and implement comprehensive anti-discrimination laws that specifically protect transgender individuals. Ensure legal recognition of transgender persons' gender identity and facilitate a smooth process for changing gender markers on official documents. Work towards decriminalizing same-sex relationships and transgender identities (Baudh, 2017).

Inclusive Education: Promote inclusive education that addresses the needs of transgender students, creating safe and supportive environments. Integrate transgender-inclusive curricula to raise awareness and understanding among students.

Healthcare Access: Improve access to transgender-friendly healthcare services, including gender-affirming care and mental health support. Train healthcare professionals to be sensitive to the unique needs of transgender individuals.

Employment Opportunities: Advocate for policies that promote equal employment opportunities and prevent discrimination based on gender identity. Encourage the creation of transgender-friendly workplaces that prioritize diversity and inclusion.

Skill Development and Entrepreneurship: Establish vocational training programs to equip transgender individuals with skills for employment and entrepreneurship. Support transgender-led businesses and initiatives through financial assistance and mentorship programs.

Community Awareness and Acceptance: Conduct awareness campaigns to challenge stereotypes and promote acceptance of transgender individuals within communities. Engage religious and community leaders to foster understanding and support for transgender rights (Chatterjee & Subhrajit, 2018).

Networking and Support Groups: Establish and strengthen support networks and community organizations for transgender individuals to share experiences, resources, and support each other.

Media Representation: Encourage positive and accurate representation of transgender individuals in media to counter stereotypes and promote inclusivity.

Capacity Building and Training: Provide training programs for law enforcement agencies, healthcare professionals, and educators to ensure they understand and respect the rights of transgender individuals.

Research and Data Collection: Conduct research on the specific challenges faced by transgender communities in India to inform evidence-based policies and programs. Collect data on the socioeconomic status, healthcare access, and educational attainment of transgender individuals to identify areas for improvement.

International Collaboration: Collaborate with international organizations and learn from successful models in other countries to implement best practices for transgender empowerment.

Sustainability in empowering transgender communities requires ongoing commitment from government bodies, NGOs, businesses, and society as a whole. By addressing the interconnected challenges, India can create a more inclusive and equitable environment for transgender individuals to thrive (Garai, 2023).

Conclusion

Empowering transgender communities in India is a multifaceted endeavor that requires concerted efforts from various sectors of society. By addressing legal, social, economic, and healthcare challenges, the goal is to create an inclusive and supportive environment that recognizes the rights and dignity of transgender individuals. Achieving this empowerment involves a combination of legislative reforms, educational initiatives, economic opportunities, and social awareness campaigns.

Legal recognition and protection form the foundation of empowerment, ensuring that transgender individuals are safeguarded from discrimination and violence. Inclusive education and employment practices contribute to breaking down societal barriers, allowing transgender individuals to access opportunities and contribute meaningfully to society. Healthcare access, both physical and mental, plays a crucial role in acknowledging and meeting the specific needs of transgender individuals.

Public awareness campaigns, media representation, and sensitization programs are vital tools in challenging stereotypes and reducing stigma. Community support and networking create a sense of belonging, fostering resilience and shared resources. Legal aid services and advocacy efforts are essential in navigating and challenging systemic injustices, promoting a more equitable legal landscape.

Policy reforms at both national and state levels are integral to institutionalizing changes and ensuring sustained progress. Collaboration with NGOs, international organizations, and government agencies amplifies the impact of initiatives, providing a comprehensive support system.

Ultimately, the empowerment of transgender communities in India is not only a matter of justice and human rights but also a pathway to building a more inclusive and vibrant society. As individuals, communities, and institutions work together, the vision is to create a future where transgender individuals can live authentically, free from discrimination and with equal access to opportunities and resources. The journey toward empowerment is ongoing, requiring ongoing commitment, education, and collaboration to bring about lasting positive change.

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Water, Sanitation, and Hygiene (WASH): Pillars of Global Health and Sustainable Development

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Abstract

Water, Sanitation, and Hygiene (WASH) are fundamental components that significantly impact global health, societal well-being, and economic growth. Throughout history, the evolution of sanitation practices and their intricate link to health outcomes has been evident, from ancient civilizations to modern times. While early human settlements managed waste in rudimentary ways, the transition to urbanization and larger populations necessitated organized waste disposal systems. In the contemporary era, the criticality of safe water, improved sanitation, and hygiene practices is underscored by statistics from the WHO/UNICEF Joint Monitoring Program, revealing substantial global populations lacking access to clean water and regulated sanitation. Poor sanitation leads to public health hazards, disproportionately affecting vulnerable groups such as women, children, and those with disabilities. The Sustainable Development Goals (SDGs), especially SDG 6, underscore the interconnectedness of water, sanitation, and health with other developmental objectives. Improved WASH infrastructure and practices are essential in preventing various diseases, including diarrheal diseases like cholera, pathogens like those causing schistosomiasis, lymphatic filariasis, and hepatitis A. This paper provides a comprehensive overview of the significance of WASH, its impact on health, and strategies for disease prevention and control. It outlines the relationship between improved sanitation, reduced mortality rates, and economic growth while emphasizing the urgent need for global initiatives to bridge the disparities in access to clean water and adequate sanitation. Achieving the WASH-related SDGs is pivotal for building healthier, more inclusive societies and fostering sustainable development worldwide.

Keywords: Water, Sanitation, Health, WASH, SDG, Sustainable Development

Introduction

Sanitation and hygiene have held immense significance since antiquity. In the earlier stages of human civilization, nomadic hunter-gatherer groups thrived for over 200,000 years. Waste in these communities naturally decomposed, presenting fewer disposal difficulties as their populations were relatively small. However, the advent of permanent settlements nearly 10,000 years ago brought about a shift towards agrarian ways of living. This change necessitated a more systematic approach to human waste disposal, leading to the adoption of practices like those outlined in the Mosaic Law of Sanitation, which involved managing excreta by depositing it in covered ground holes.

Sophisticated water and drainage systems have been traced back to ancient societies such as Harappa and Mohenjo-Daro. In Prehistoric Greece as well, advanced infrastructure for water supply, drainage networks, and flushing toilets was utilized. Initially, the practice of open defecation was considered less problematic due to the presence of abundant open spaces and a lower population density.

However, with the advancement of urbanization, the act of open defecation emerged as a substantial concern impacting public health and human dignity, notably as cities and towns experienced rising population numbers. Consequently, this spurred a worldwide emphasis on reducing open defecation, underlining the crucial need for enhanced sanitation methods.

According to WHO/UNICEF Joint Monitoring Program (JMP) 2023 With 115 million people consuming surface water, 2.2 billion people still lacked access to safely managed drinking water and 419 million people

practiced open defecation out of the 3.5 billion people who still lacked access to safely regulated sanitation in 2022.Top of Form

As per the World Health Organization (WHO), environmental sanitation involves overseeing and regulating all environmental aspects that affect human physical growth, health, and existence, either currently or with potential harm. This comprehensive approach encompasses managing elements within the environment—such as air quality, water purity, waste disposal, and hygiene standards—that can directly or indirectly impact human well-being. The primary goal is to prevent or mitigate potential adverse effects, safeguarding public health and ensuring better living conditions worldwide through proactive measures and interventions.

Health plays a crucial role in a thriving society, as the fear of illness can impede productivity, consumption, leisure activities, travel, and overall human and economic well-being (Smith et al., 2019). Attaining good health and promoting social and economic progress require adequate sanitation, practicing proper hygiene, and ensuring access to safe water. In 2008, the Prime Minister of India echoed a statement made by Mahatma Gandhi in 1923, emphasizing that "sanitation is more important than independence." Enhancing health conditions has the potential to significantly reduce disease rates and their severity, thereby improving the lives of numerous individuals, particularly children, in developing nations.

Sanitation and Health

The recognition of sanitation's importance in fostering community well-being dates back to ancient times. Archaeological findings of latrines, cesspits, and drainage channels unearthed from various ancient civilizations such as the Mesopotamian Empire (present-day Iraq), Scotland (3200 B.C.), ancient Greece (3000 B.C.), China (2500 B.C.), and Egypt (2100 B.C.) attest to this fact (Bond et al., 2013).

However, the widespread acknowledgment and advocacy of the link between sanitation and disease only gained momentum in the 1800s during the Sanitary "Awakening" or "Revolution." Despite the existence of toilets and sewer systems in many historical cities (Angelakis et al., 2010), their functioning was akin to systems prevalent in several parts of the world today, where wastewater remains untreated (Naughton & Mihelcic, 2017). This untreated wastewater can contribute to the spread of diseases and environmental deterioration.

Moreover, traces of harmful parasites and pathogens, such as whipworm (Trichuris trichiura), roundworm

(Ascaris lumbricoides), and dysentery-causing agents like Entamoeba histolytica, have been discovered in ancient toilets and other waste disposal sites (Mitchell, 2017).

Moreover, there exists compelling evidence indicating that sanitation quality significantly influences psychosocial stress and well-being. Elements like safety, privacy, aversion to unhygienic conditions, and conflicts stemming from collective action failure can profoundly impact individuals' mental and emotional states (Shiras et al., 2018).

Among the most vulnerable groups, including women, children, and individuals with disabilities, there is limited research on the sanitation needs of disabled persons, but ample studies focus on the demands of women and children in this regard. Children under five years old are particularly susceptible to diarrheal diseases, while women suffer physically, psychologically, and socially when proper sanitation facilities are lacking.

The absence of adequate facilities at home exacerbates women's workload, forcing them to travel long distances for suitable sanitation and safe drinking water. Improper waste disposal also leads to the proliferation of disease-carrying flies, further endangering public health.

The major faecal-oral disease transmission pathways are demonstrated in the "F Diagram" which illustrates the importance of particular interventions, notably the safe disposal of faeces, in preventing disease transmission
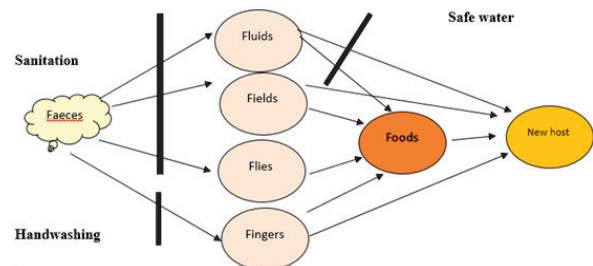
Figure 1   Faecal-oral disease transmission pathways "F Diagram"

According to WHO data 2019 the significance of death rates attributed to unsafe sanitation practices is an indicator of mortality impacts across different countries and over time. It emphasizes the comparative nature of death rates, which provide a standardized measure by calculating the number of deaths per 100,000 individuals in a specific country or region. The death rates from unsafe sanitation globally depicts stark disparities between countries.it significantly elevated death rates in lower-income nations, particularly in regions like Sub-Saharan Africa and Asia.

One striking observation is the vast discrepancy in death rates between low-income countries and wealthier ones. The statement suggests that in numerous low-income countries, death rates due to unsafe sanitation practices are more than 1000 times higher when compared to rates in affluent or high-income countries.

This disparity sheds light on the substantial impact of inadequate sanitation on mortality in less economically developed nations, underlining the urgent need for improved sanitation infrastructure, access to clean water, and enhanced public health measures to mitigate these disparities and improve overall well-being.

Water Sanitation and Sustainable Goal

In 2012 United Nation's conference on Sustainable Development (SDGs) in Rio de Janeiro the Sustainable Development Goals (SDGs) were born. With the aim of outline a set of global goals of development focusing on environmental, political and economic challenges. It reaffirms the developmental challenges by replacing Millennium Development Goals (MDGs) which was introduced in 2000 to eradicate poverty mainly. Among all 17 sustainable development goal (SDG), SDG 6 is interconnected with rest of 16 (Zheng et al., 2016).

Figure 2 Conceptual systems model of the Sustainable Development Goals and Their Interconnection

Source: *"More than Target 6.3: A Systems Approach to Rethinking Sustainable Development Goals in a Resource-Scare World" (Zhang et al., 2016)*

The figure demonstrates that by establishing robust infrastructure (Goal 9), it paves the way for creating sanitation facilities (Goal 6). This development not only leads to improved school enrollment for both genders but particularly benefits young girls, offering them safety, protection from violence, privacy (Goals 4 & 5). Addressing dropout rates promotes equal opportunities, reducing inequality and the gender gap. Women, being primary educators, ensure literacy for the next generation, fostering human capital for the economy. This pathway contributes to attaining Goal 5.

Enhanced access to water and sanitation diminishes illness, reducing morbidity and mortality rates, consequently saving substantial income spent on healthcare, treatment, and lost productive days. Time spent collecting water detracts from educational pursuits and income-generating activities, aligning with Goal 6, essential for providing a healthy life (Goal 3).

The safety issues faced by women and children when venturing out for sanitation needs expose them to physical and sexual assaults. Addressing these concerns fosters safety, empowerment, inclusive cities, and community well-being (Goal 11), achieved by meeting water and sanitation objectives related to health. Strengthening community capacity and promoting economic growth (Goal 8) occur through increased community participation and investment in resilient infrastructure (Goal 9), enhancing localized trade and city resilience. Moreover, achieving access to energy infrastructure (Goal 7) links to building resilient infrastructure (Goal 9).

The objective of promoting human health (SDG 3) and fostering economic growth and employment (SDG 8) are intrinsically linked. Within SDG 12, specifically in section 12.2 aiming for sustainable management and efficient utilization of natural resources, treating wastewater becomes pivotal. Energy retrieval from wastewater via anaerobic digestion is a viable method (Naughton & Mihelcic, 2017). Typically, the most significant component of wastewater is water, accounting for approximately 99% (Naughton & Mihelcic, 2017), offering a solution to water scarcity by reusing treated water for various purposes. Additionally, apart from water and energy, wastewater comprises essential nutrients like nitrogen and phosphorus.Top of Form

WASH and the illnesses that stem from insufficient practices in these domains

Diarrhea

Diarrheal Disease, a widespread fecal-oral illness globally, results in an estimated 1.6–2.5 million deaths annually, disproportionately affecting children under 5 years old in developing nations (Mathers CD, Lopez AD, Murray CJL, 2006). In scenarios where sanitation and hygiene standards are inadequate – such as the lack of proper handwashing facilities or improper feces disposal – human waste can contaminate hands, subsequently leading to food contamination or person-to-person transmission. Diarrhea remains a significant cause of mortality among children under five, particularly in developing nations. The World Health Organization (WHO) underscores the critical role of enhanced access to clean water, sanitation facilities, and improved hygiene practices in preventing diarrheal diseases and associated fatalities.

Pathogens originating from feces typically enter water-based sewage systems via flush toilets or latrines, potentially contaminating surface waters and groundwater. Additionally, human waste can directly pollute soil, posing risks upon contact, while flies might transport pathogens from waste to food. These pathways create a potential risk of contracting diarrheal diseases through the consumption of contaminated drinking water, recreational water, or food. Animal waste similarly acts as a source for transmitting pathogens. The primary transmission route depends on factors like the survival traits of the pathogen, local infrastructure, and human behavior.

Several interventions have demonstrated their effectiveness in interrupting the transmission cycle of pathogens at various stages. Improved sanitation practices have proven highly impactful in reducing rates of diarrheal diseases, with research indicating a decrease ranging from 32% to 37% (Fewtrell et al., 2009). In a longitudinal cohort study carried out in Salvador, Brazil, it was observed that increasing sewerage coverage from 26% to 80% within the specified population resulted in a notable 22% decline in the occurrence of diarrhea among children under the age of 3.

Neglected Tropical Disease

Neglected Tropical Diseases (NTDs) are widespread infections that afflict individuals in Sub-Saharan Africa, especially those residing below the poverty line set by the World Bank. Nearly every person in this demographic is affected by one or more NTDs. These diseases encompass soil-transmitted helminths, schistosomiasis, onchocerciasis, lymphatic filariasis, trachoma, and malaria. Soil-transmitted helminths, parasitic worms residing in the human intestine, infect over a billion individuals. Roundworm, whipworm, and hookworm infections are prevalent in tropical and subtropical regions, particularly in developing nations where there is inadequate access to safe drinking water and proper sanitation practices (including the disposal of human waste) (Ziegelbauer et al., 2012).

Infected individuals excrete the eggs of these helminths, leading to soil contamination. Roundworm or whipworm infections occur when individuals consume raw, unwashed vegetables or neglect to wash their hands after touching contaminated soil. This mode of transmission is especially prevalent among children. Enhancements in water, sanitation, and hygiene (WASH) infrastructure, alongside the encouragement of appropriate hygiene habits, play a vital role in attaining long-term control, elimination, or eradication of numerous neglected tropical diseases (NTDs).Top of Form

Schistosomiasis

Worm parasites are the cause of the acute and chronic disease schistosomiasis. When schistosomiasis patients contaminate freshwater sources with their excrement, which contains parasite eggs, transmission takes place. These eggs hatch into larvae that grow into adult schistosomes in water. The adult worms live in blood arteries, especially in the veins close to the bladder or intestines, where the females deposit their eggs. A portion of the eggs leave the body through urine or faeces, which completes the parasite's life cycle. Others, however, lodge in bodily tissues and trigger immunological reactions as well as organ damage over time (WHO).

Infections with Schistosomiasis come in two varieties. The first kind, known as urogenital schistosomiasis, is prevalent in the Philippines, China, Indonesia, Africa, the Middle East, the Caribbean, Brazil, Venezuela, Suriname, and some parts of Cambodia and the Lao People's Democratic Republic.

One of the most debilitating symptoms of chronic intestinal schistosomiasis is hepatosplenomegaly, or the enlargement of the liver and spleen (Gryseels, 2006; Colley, 2014). On the other hand, bladder cancer risk has been linked to urogenital schistosomiasis, among other severe bladder issues (Rollinson, 2009). In addition to household hygiene practises, community-wide hygiene practises also affect an individual's risk of contracting the disease.

Lymphatic Filariasis (Elephantiasis)

The main goal of schistosomiasis control efforts is to reduce the disease by regularly treating a large portion of the population with praziquantel, a prescription drug used as an anti-worm treatment. A more thorough solution, however, entails putting policies in place to supply drinkable water, guarantee sufficient hygienic facilities, and manage snail populations—which serve as the parasite's intermediary hosts. Most Schistosoma eggs can be contained by having access to and using adequate sanitation facilities, which will stop the miracidia stage from infecting intermediate host snails (Grimes et al., 2015).

Wuchereria bancrofti, Brugia malayi, or B. timori are the three species of filarial nematodes that cause this disease; they are spread by mosquitoes (WHO, 2013). These worms belong to the family Filariodidea and are nematodes, or roundworms, that live in the lymphatic system. Classified as a Neglected Tropical Disease (NTD), this kind of infection negatively affects the lymphatic system and frequently causes aberrant expansion of bodily parts, which causes pain, severe disability, and social disgrace.

Dracunculiasis (Guinea Worm)

Dracunculiasis, commonly known as Guinea worm disease, is caused by the parasitic infection of Dracunculus medinensis, a type of nematode or roundworm. This disease primarily affects humans and is transmitted through contaminated drinking water that contains water fleas carrying the infective larvae of the Guinea worm. Once ingested, the larvae mature and develop into long, thread-like worms inside the human body.

The adult female Guinea worm can grow up to several feet in length and typically emerges from painful blisters, often in the lower limbs. This painful emergence of the worm through the skin causes intense discomfort and leads to incapacitation, making it challenging for those infected to carry out their daily activities. Treatment primarily involves slowly extracting the worm by winding it around a stick over several days, while preventing the wound from being submerged in water to avoid releasing more larvae into the environment.

Efforts to eradicate Guinea worm disease have been successful in reducing its prevalence significantly, with ongoing initiatives focused on complete eradication worldwide. Public health interventions primarily revolve around improving access to clean and safe drinking water, community education about disease prevention, and the implementation of effective control measures to interrupt the life cycle of the Guinea worm.

As of October 30, 2020, a total of 198 countries, territories, and areas have been officially certified as free from dracunculiasis transmission. Among the remaining seven countries yet to receive certification, one country, the Democratic Republic of the Congo, has no recent history of dracunculiasis transmission. The other six countries fall into two categories: some are still endemic (Angola, Chad, Ethiopia, South Sudan, and Mali), meaning they still experience ongoing cases of the disease, while others are in the precertification phase (Sudan), working towards meeting the criteria for being declared free of dracunculiasis transmission.

Onchocerciasis

The parasitic disease known as human onchocerciasis, or river blindness, is brought on by the filarial worm Onchocerca volvulus. Black flies (Simulium spp.), which breed in swift-moving rivers and streams and are primarily found in isolated communities close to fertile terrain where people depend on agriculture, are the carriers of the virus. As per WHO (2018), it is the second leading cause of infectious blindness worldwide. Onchocerciasis, a rare but potentially fatal illness, results in severe impairment and chronic suffering; each year, it claims 1.5 million impairment-Adjusted Life-Years

(DALYs) (Remme et al 2006). An onchocerca infection weakens the immune system, impairs host immunity, and makes the body more susceptible to illness (Remme et al 2006). Thirty-one African countries include more than 99 percent of the infected individuals. It is also found in Yemen and a small portion of Latin America. For a minimum of ten to fifteen years, the WHO advises ivermectin treatment every year. According to estimates from the Global Burden of Disease Study, there were 20.9 million O. volvulus infections that were commonplace worldwide in 2017. Of those infected, 14.6 million suffered from skin diseases, and 1.15 million experienced visual loss.

Hepatitis A

A viral liver disease called hepatitis A can produce mild to severe symptoms. In the liver, viruses multiply. An increased risk of contracting hepatitis A is linked to inadequate sanitation and hygiene, including hand hygiene. (WHO, 2019) About 7134 people died in 2016 with hepatitis A, which accounted for 0.5% of all deaths from viral hepatitis. Male patients have a greater incidence of acute A hepatitis (Jung et al., 2012; Henessey et al., 2009). This is due to the fact that men must travel more frequently than women and are exposed to unclean environmental conditions more frequently. The main way that the hepatitis A virus spreads is through oral faeces, although an infected person's poor hygiene habits can also spread the infection.

Conclusion

In conclusion, the nexus between Water, Sanitation, and Hygiene (WASH) and public health is undeniable. Across history, from ancient civilizations to contemporary societies, the impact of inadequate sanitation practices on health has been profound. The lack of access to safe water and proper sanitation facilities leads to a multitude of diseases, ranging from diarrheal illnesses to neglected tropical diseases like schistosomiasis, lymphatic filariasis, and hepatitis A.

These diseases are particularly rampant in regions with poor sanitation infrastructure, limited access to clean water, and inadequate hygiene practices. Diarrheal diseases, for instance, remain a significant cause of mortality, especially among children under five years old in developing nations. Neglected tropical diseases affect millions of individuals, perpetuating a cycle of illness and poverty.

Efforts to combat these diseases involve multifaceted approaches, encompassing improvements in WASH infrastructure, community education on proper hygiene practices, disease-specific treatments, and public health interventions. Access to clean water, enhanced sanitation

facilities, and hygiene education are crucial in preventing the transmission of these diseases and improving overall health outcomes, especially among vulnerable populations such as women and children.

The Sustainable Development Goals (SDGs) established by the United Nations highlight the significance of achieving universal access to water, sanitation, and hygiene. These goals underscore the interconnectedness between WASH and various facets of human development, including health, gender equality, education, economic growth, and environmental sustainability.

To mitigate the impact of these diseases, concerted global efforts are required to address the root causes by investing in infrastructure, promoting education and behavioral changes, and implementing effective interventions. By prioritizing WASH initiatives, we can alleviate the burden of preventable diseases, improve livelihoods, and create healthier and more resilient communities worldwide.

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Multidimensional Poverty in Odisha: Some Recent Evidence

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Abstract

NITI Aayog has published 'National Multidimensional Poverty Index – A Progress Review 2023'. As per the progress review report, the share of India's population who are multidimensionally poor has declined from 24.85% in 2015-16 to 14.96% in 2019-21. Among states, Kerala has lowest poverty (0.55%) and Bihar has highest poverty (33.76%). This index is based on the NFHS Round 5 data (2019-21). As per the report, Odisha multidimensionally poor has declined from 29.34% in 2015-16 to 15.68% in 2019-21. Though there is significant reduction in multidimensional poverty still low nutrition, less access to safe cooking fuel, less sanitation coverage and less housing coverage are contributing towards 15.68% multidimensional poverty. Odisha's performance is noteworthy in comparison to neighbouring and comparable states. Though Odisha has performed well between NFHS – 4 and NFHS – 5, due to historical incidence of backwardness, there is broad gap to catch up with lowest MPI states. Odisha's poverty has precipitously decreased by 24.61 percentage points from 57.20% (2004-05) to 32.59% (2011-12). Average annual decline in poverty is 3.52 percentage points. This was highest reduction in poverty among major states in the country. The state has performed way better than nation and major states in terms of elimination of poverty over last two decades. The state has been largely successful in multidimensional development and eliminating poverty at a faster level than nation. Among other accomplishment in SDG, the achievements of the state is remarkable in the domain of elimination of poverty in lass two decades. Several welfare measures with targeted interventions have lead to achievement of fastest poverty reduction and state is targeting to reduce poverty to 10% by the end of 2025 and end multidimensional poverty by 2030. Improvement in social sector indicators, elimination of all forms of poverty, hunger, malnutrition and provision of basic standards of living will lead to achievement of 2030 agenda of Sustainable Development in Odisha.

Keywords: Poverty, MPI, Multidimensional poverty, Odisha, India, Education, Health, Social Sector Development, SDG, Sustainable Development

Introduction

Poverty is pronounced deprivation in well-being. Poverty anywhere is a threat to prosperity everywhere. Since independence, defining a poverty line has been a debatable issue. During1970s, first such poverty line concept in India was came into existence. Generally, poverty measures in India are money metric in nature and calculated according to a threshold level of MPCE. The connotation of poverty has changed over the years to adjust the measures of poverty line and poverty ratio. The constitution of a Working Group (1962), the Alagh Committee (1979), Lakdawala Committee (1989), Tendulkar Committee (2005), and Rangarajan Committee (2009) contributed to redefining poverty in the country, particularly those of the poor (Government of India, 2009). Multidimensional poverty measures poverty from multiple perspective in terms of education, health, standard of living etc and also involves nonmetric measures in terms of access and deprivation of basic necessities of life (Alkire and Foster, 2011). The paper studies evolution of poverty and number of poor population since independence till date for Odisha and compares with recent multidimensional poverty statistics of Odisha with other states of India.

Poverty in Odisha

All round growth of Odisha Economy began in the 1940's and accelerated during the post-independence era in the 1950s, with the introduction of planned development. Odisha's paramount mineral reserves, flora and fauna, 484 km long coastline would lead to multidimensional development of all regions of Odisha and all sections of society with special focus on deprived population. Balanced regional development helps in poverty alleviation as fruits of growth reaches to all the section of population and gap between rich and poor diminishes gradually. Tendulkar Committee Report (2005) and several subsequent national Sample Survey Organisations survey results outlines estimates of poverty for state and nation. Poverty is denoted in terms of poverty line and head count ratio. The poverty lines for the state are estimated at Rs.695 for rural and Rs.861 for urban area by 2011-12. 32.59% of population (138.2 lakh people) were below poverty line in Odisha by 2011-12. Several welfare measures with targeted interventions have lifted 82 lakh people out of poverty. Poverty has declined by 24.61 percentage points from 57.20% (2004-05) to 32.59% (2011-12). Average annual decline in poverty is 3.52 percentage points. This was highest reduction in poverty among major states in the country (Economic Survey, 2022). It is worth noting that, India saw 15 percentage points poverty reduction and average annual decline in poverty for the country was 2.14 percentage points during the same period (Government of India, 2009). The state has performed way better than nation and major states in terms of elimination of poverty over last two decades. Several welfare measures with targeted interventions have lead to achievement of fastest poverty reduction and state is targeting to eliminate poverty in Odisha. Percentage of poor population in Odisha and India (Rural and Urban) from 1973 to 2012 is given in Table 1.

Table 1   Percentage of Rural and Urban Poor in Odisha and India

Year	Odisha		India	
	Rural	**Urban**	**Rural**	**Urban**
1973-74	67.78	55.62	56.44	49.01
1977-78	72.38	50.92	53.07	45.24
1983-84	67.53	49.15	45.65	40.79
1987-88	57.64	41.53	39.09	38.2
1993-94	49.72	41.64	37.27	32.36
1999-00	48.01	42.83	27.09	23.62
2004-05	60.80	37.60	41.80	25.70
2011-12	35.69	17.29	25.70	13.70

Source: Planning Commission Reports

In 1973-74, 66.2% of people were poor, which increased to 70.1% (1977-78), declined to 65.3% (1983), to 55.6% (1987-88), to 48.6% (1993-94) and again declined to 46.6% (2004-05). Poverty started declining after the year 1978. Elimination was more prominent between 1977-78 and 1987-88 (14.5 percentage points). 67.2% of people were poor in rural area, which increased to 72.4% (1977-78), again declined to 67.5% (1983), to 57.6% (1987-88), and to 49.7% (1993-94) and finally declined to 46.8% (2004-05). Between 1993-2005, poverty in total has declined only 2 percentage points. In rural area, decline was 2.9 percentage points (Panda, 2015). The state has performed way better than nation and major states in terms of elimination of poverty over last two decades. Several welfare measures with targeted interventions have lead to achievement of fastest poverty reduction and state is targeting to eliminate poverty.

Multidimensional Poverty Index of India

Government of India's premier thinktank NITI Aayog, New Delhi has published '*National Multidimensional Poverty Index – A Progress Review 2023*' in July 2023 (NITI Aayog, 2023). India's first ever multidimensional poverty index measure based NFHS Round 4 data (2015-16) was published in November 2021. The progress review report is based NFHS Round 5 data (2019-21). The multidimensional poverty index is popularly employed non-money metric poverty index in the world. The index covers overlapping deprivations in health, education and basic standards of living. The non-money metric measures complements money-metric poverty measurements because it measures and compares deprivations directly on the basis of several aspects of development (Alkire and Foster, 2011).

The Global Agenda 2030 for Sustainable Development was signed on 25 September 2015 by 193 member nations of UN. The agenda established the 17 Sustainable Development Goals (SDG), 169 targets and 232 indicators. SDG 1 and Target 1.2 calls for Ending poverty in all its forms everywhere. The goal is multidimensional in its totality. Multidimensional poverty index has wide ranging application for any country in terms of development of schemes and targeted interventions which contribute towards elimination of poverty in all its form from everywhere in the world. The district-wise estimation of multidimensional poverty will help in identifying deprived districts based on these

indicators and accordingly policies can be planned and implemented for reaching the goal of Left No One Behind by the year 2030.

NITI Aayog has prepared this index with consultation with Ministries of Union Government. The index has 3 equally weighted dimensions namely health, education and Basic Living Standard. These three dimensions are measured by 12 indicators listed below.

(i)   Nutrition

(ii)   Child and adolescent mortality

(iii)   Maternal health

(iv)   Years of schooling

(v)   School attendance

(vi)   Cooking fuel

(vii)   Sanitation

(viii) Drinking water

(ix)   Electricity

(x)   Housing

(xi)   Assets

(xii)   Bank account

As per the progress review report, the share of India's population who are multidimensionally poor has declined from 24.85% in 2015-16 to 14.96% in 2019-21. Among states, Kerala has lowest poverty (0.55%) and Bihar has highest poverty (33.76%). This review report is based on NFHS Round V data (2019-21) (IIPA, 2021). Percentage of population who are poor in these 12 indicators in all states and union territories of India is given in Table 2.

Table 2   State/UT Wise Multidimensional Poor Population in India (2019-21)

Sl No	State	Headcount Ratio (%)
1	Bihar	33.76
2	Jharkhand	28.81
3	Meghalaya	27.79
4	Uttar Pradesh	22.93
5	Madhya Pradesh	20.63
6	Assam	19.35
7	Chhattisgarh	16.37
8	Odisha	15.68
9	Nagaland	15.43
10	Rajasthan	15.31
11	Arunachal Pradesh	13.76
12	Tripura	13.11
13	West Bengal	11.89
14	Gujarat	11.66
15	Uttarakhand	9.67
16	Manipur	8.10
17	Maharashtra	7.81
18	Karnataka	7.58
19	Haryana	7.07
20	Andhra Pradesh	6.06
21	Telangana	5.88
22	Mizoram	5.30
23	Himachal Pradesh	4.93
24	Punjab	4.75
25	Sikkim	2.60
26	Tamil Nadu	2.20
27	Goa	0.84
28	Kerala	0.55
	Union Territory	
1	Dadra & Nagar Haveli & Daman & Diu	9.21
2	Jammu & Kashmir	4.80
3	Ladakh	3.53
4	Chandigarh	3.52
5	Delhi	3.43
6	Andaman & Nicober Islands	2.30
7	Lakshadweep	1.11
8	Puducherry	0.85
	India	14.96

Source: NITI Aayog National Multidimensional Poverty Index: A Progress Review 2023

Reduction of Multidimensional Poverty in Odisha

As per the progress review report, Odisha's multidimensionally poor population has declined from 29.34% in 2015-16 to 15.68% in 2019-21 (NITI Aayog, 2023). Total MPI score of Odisha is 0.07 (Rural MPI score - 0.079 and Urban MPI score - 0.023). Poverty headcount ratio for the state is 15.68% (Rural – 17.72% and Urban – 5.42%) whereas intensity score is 44.5% (Rural – 44.58% and Urban – 43.15%). As per the report, Puri has lowest multidimensional poverty (3.29%) while Malkangiri has highest multidimensional poverty (45.01%). 16 districts of Odisha have lower multidimensional poverty than state average and 15 districts have lower multidimensional poverty than national average. Percentage of population

who are multidimensionally poor in each district is given in Table 3.

Table 3 District Wise Multidimensional Poor Population in Odisha (2019-21)

Sl No	District	Headcount Ratio (%)
1	Malkangiri	45.01
2	Rayagada	34.03
3	Koraput	33.54
4	Nabarangapur	33.45
5	Mayurbhanj	30.57
6	Gajapati	28.14
7	Kendujhar	26.76
8	Kandhamal	25.30
9	Nuapada	20.19
10	Kalahandi	19.47
11	Bhadrak	16.60
12	Deogarh	16.56
13	Boudh	16.27
14	Dhenkanal	15.98
15	Sundargarh	14.77
16	Balasore	14.21
17	Jajpur	14.10
18	Angul	13.87
19	Bargarh	11.51
20	Sambalpur	10.05
21	Balangir	9.52
22	Kendrapara	8.90
23	Sonepur	8.68
24	Jharsuguda	7.09
25	Nayagarh	6.63
26	Ganjam	6.31
27	Cuttack	6.31
28	Khordha	3.95
29	Jagatsinghapur	3.53
30	Puri	3.29
	Odisha	15.68

Source: NITI Aayog National Multidimensional Poverty Index: A Progress Review 2023

State has witnessed significant reduction in multidimensional poverty. Government of Odisha is targeting to multidimensional reduce poverty to 10% by the end of 2025 and end multidimensional poverty by 2030 as per SDG Target 1.2. State is adopting many pro-poor welfare measures and interventions like KALIA, Biju Swasthya Kalyan Yojana, Mamata, Balaram, Biju Pacca Ghar Yojana, MUKTA, BASUDHA, Sujal, Madhu Babu Pension Yojana, Vasundhara, Mission Shakti, Mo Ghara among others in this direction.

Table 4 Reduction of Multidimensional Poverty in Odisha and India (%)

Region	Odisha			India		
Year	Headcount Ratio	Rural	Urban	Headcount Ratio	Rural	Urban
2015-16	29.34	32.64	12.32	24.85	32.59	8.65
2019-21	15.68	17.72	5.42	14.96	19.28	5.27

Source: NITI Aayog National Multidimensional Poverty Index: A Progress Review 2023

Among other accomplishment in SDG, the achievements of the state is remarkable in the domain of elimination of poverty in lass two decades. Improvement in social sector indicators, elimination of all forms of poverty, hunger, malnutrition and provision of basic standards of living will lead to achievement of 2030 agenda of Sustainable Development in Odisha.

Table 5 Reduction in Indicators of Multidimensional Poverty in Odisha (%)

Part A: Health and Education

Indicator	Health			Education	
Year	Nutrition	Child & Adolescent Mortality	Maternal Health	Years of Schooling	School Attendance
2015-16	37.27	2.23	19.49	16.64	4.95
2019-21	30.77	1.57	14.83	13.44	3.92

Source: NITI Aayog National Multidimensional Poverty Index: A Progress Review 2023

Part B: Standard of Living

Indicator	Standard of Living						
Year	Cooking Fuel	Sanitation	Drinking Water	Electricity	Housing	Asset	Bank Account
2015-16	80.94	70.32	20.61	13.36	55.80	19.22	10.94
2019-21	65.94	39.85	13.55	3.04	40.70	12.30	2.53

Source: NITI Aayog National Multidimensional Poverty Index: A Progress Review 2023

Region wise analysis of multidimensional poverty will enable to identify the deprived population. Undivided Koraput and Kandhamal region has historical incidence of poverty in Odisha. These region include districts

namely: Nabarangapur, Malkangiri, Koraput, Rayagada, Kalahandi, Kandhamal, Nuapada, Subarnapur and Balangir. The Kandhamal Balangir Koraput (KBK) region poverty is highlighted in several literature and report (Panda, 2023; Government of Odisha, 2022; Panda, 2021). Percentage of population who are deprived in each indicator for undivided Koraput and undivided Kandhamal region is given in Table 6.

Table 6   Indicator Wise Score of Undivided Koraput and Undivided Kandhamal Districts

District	Nutrition	Child & Adolescent Mortality	Maternal Health	Years of Schooling	School Attendance	Cooking Fuel	Sanitation	Drinking Water	Electri-city	Housing	Assets	Bank Account
Nabarangapur	53.72	4.06	33.56	34.15	15.40	90.73	83.31	26.92	29.89	80.22	33.74	19.31
Malkangiri	58.90	6.94	28.08	43.56	17.12	94.63	83.26	19.56	11.53	76.07	35.56	9.26
Koraput	47.60	2.56	24.91	38.82	15.58	81.10	82.22	20.06	22.62	59.13	39.72	16.35
Rayagada	46.62	5.50	25.96	36.80	12.98	83.60	76.90	16.26	19.18	59.51	36.58	15.80
Kalahandi	41.41	1.83	21.33	28.84	8.47	92.52	85.40	27.27	31.17	75.93	27.94	16.98
Kandhamal	42.69	3.57	27.12	19.50	5.43	93.88	83.95	52.94	20.93	63.14	45.09	6.69
Nuapada	49.05	2.52	16.59	21.37	7.34	90.56	80.02	18.59	16.83	71.33	17.54	5.85
Subarnapur	43.04	2.03	14.17	11.83	1.28	85.30	82.59	17.64	9.16	64.12	17.77	6.63
Balangir	44.84	2.19	10.63	16.15	4.01	90.57	85.50	22.09	15.62	65.84	16.75	6.08
Odisha	30.77	1.57	14.83	13.44	3.92	65.94	39.85	13.55	3.04	40.70	12.30	2.53
India	31.52	2.06	19.17	11.40	5.27	43.90	30.13	7.32	3.27	41.37	10.16	3.69

Source: NITI Aayog National Multidimensional Poverty Index: A Progress Review 2023

If we analyse indicator score for these districts, it can be said that low nutrition, less access to safe cooking fuel, less sanitation coverage and less housing coverage are contributing towards high multidimensional poverty. However, in indicators like child & adolescent mortality, school attendance, and bank account these districts are performing well in comparison to other indicators. Odisha has undertaken SDG Based Planning and Budgeting since 2020-21. State is putting utmost focus and allocating significant fund in concerned areas. State has achieved highest reduction in infant mortality rate and second highest reduction in maternal mortality ratio in the country. As per NFHS Round V data (2019-21), institutional birth in Odisha is 92% which is higher than national average and among many states of the country (IIPS, 2021). Data driven governance and real time monitoring of schemes and programmes will certainly be helpful in achieving required targets and objectives.

MPI of Odisha and Comparable States

It is very interesting to study multidimensional poverty of comparable states namely Chhattisgarh, Jharkhand, West Bengal, Madhya Pradesh and Rajasthan. This will help us in understanding where the Odisha stands in terms of these 12 indicators compared to other states of the country.

In all indicators, progress of Odisha is visible between NFHS-4 and NFHS-5 (IIPS, 2021). In Stunting Children indicator, Odisha's performance is better than West Bengal and Chhattisgarh but lagging behind Jharkhand, Madhya Pradesh and Rajasthan. In Underweight Children indicator, Odisha is doing well in comparison to West Bengal but lagging behind Chhattisgarh, Jharkhand, Madhya Pradesh and Rajasthan. In Women BMI indicator, Odisha's performance is ahead of Chhattisgarh, Jharkhand and Madhya Pradesh but falling short of West Bengal and Rajasthan. In Men BMI indicator, all neighbouring states are performing well in comparison to Odisha. Overall in Nutrition component, Odisha's performance is better than neighbouring and comparable states.

In Child and Adolescent Mortality category, Odisha's performance is lagging behind all neighbouring and comparable states in all 3 indicators (neonatal mortality rate, infant mortality rate and under-five mortality rate). In at least 4 antenatal care visits of Mother indicator, Odisha's progress is noteworthy and way ahead of Chhattisgarh, Jharkhand and West Bengal. In Institutional Birth indicator and Births attended by skilled health personnel indicator, Odisha's performance is lagging behind all neighbouring and comparable states. Overall in Health component, Odisha's performance is lagging behind neighbouring and comparable states.

In Years of Schooling – Women indicator, Odisha is performing better than Jharkhand and Madhya Pradesh but lagging behind Chhattisgarh and Rajasthan. In Years

of Schooling – Men indicator, Odisha's performance is better than Chhattisgarh, Jharkhand, Madhya Pradesh and Rajasthan. In School Attendance indicator, Odisha is performing better than Chhattisgarh, Jharkhand, Madhya Pradesh and West Bengal. Overall in Education component, Odisha's performance is better than neighbouring and comparable states.

In Cooking Fuel indicator, Odisha's performance is better than all neighbouring and comparable states. In Sanitation indicator, Odisha is performing better than West Bengal and Madhya Pradesh but lagging behind Chhattisgarh, Jharkhand and Rajasthan. In Drinking Water indicator, Odisha's performance is better than West Bengal but lagging behind Chhattisgarh, Jharkhand, Madhya Pradesh and Rajasthan. In Electricity indicator, Odisha is performing better than Chhattisgarh, Madhya Pradesh, West Bengal and Rajasthan and only lagging behind Jharkhand. In Bank Account indicator, Odisha's performance is better than Chhattisgarh and Rajasthan but lagging behind Jharkhand, Madhya Pradesh and West Bengal. Overall in Standard of Living component, Odisha's performance is better than neighbouring and comparable states. Indicator wise score of Odisha and other comparable states between two latest rounds of NFHS is outlined in Table 7.

Table 7   Indicator Wise Score of Odisha and Comparable States between NFHS 4 and 5

	State		Odisha		Chhattisgarh		Jharkhand		West Bengal		Madhya Pradesh		Rajasthan	
Sl No	Indicator	Detailed Indicators	NHFS 4	NHFS 5	NHFS 4	NHFS 5	NHFS 4	NHFS 5	NHFS 4	NHFS 5	NHFS 4	NHFS 5	NHFS 4	NHFS 5
1	Nutrition	Stunted Children	34.1	31.0	37.6	34.6	45.3	39.6	32.5	33.8	42.0	35.7	39.1	31.8
		Underweight Children	34.4	29.7	37.7	31.3	47.8	39.4	31.6	32.2	42.8	33.0	36.7	27.6
		Women BMI	26.5	20.8	26.7	23.1	31.5	26.2	21.3	14.8	28.4	23.0	27.0	19.6
		Men BMI	19.5	15.3	24.1	17.4	23.8	17.1	19.9	15.1	28.4	20.8	22.7	14.0
2	Child & Adolescent Mortality	NNMR	28.2	27.0	42.1	32.4	33.0	28.2	22.0	15.5	36.9	29.0	29.8	20.2
		IMR	39.6	36.3	54.0	44.3	33.0	28.2	27.5	22.0	51.2	41.3	41.3	30.3
		U5MR	48.1	41.1	64.3	50.4	54.3	45.4	26.8	22.3	64.6	49.2	50.7	37.6
3	Maternal Health	Antenatal care	61.9	78.1	59.1	60.1	30.3	38.6	76.4	75.8	35.7	57.5	38.5	55.3
		Institutional births	85.3	92.2	70.2	85.7	61.9	75.8	75.2	91.7	80.8	90.7	84.0	94.9
		Skilled Home Birth	3.3	1.9	8.4	5.8	8.0	8.4	6.8	2.6	2.3	2.5	3.2	1.4
		Skilled Birth	86.5	91.8	78.0	88.8	69.6	82.5	81.6	94.1	78.0	89.3	86.6	95.6
4	Years of Schooling	Women years of schooling	26.7	33.0	26.5	36.9	28.7	33.2	26.5	32.9	23.2	29.3	25.1	33.4
		Men years of schooling	37.1	38.6	36.0	41.5	40.2	46.6	33.8	34.7	34.3	39.9	43.8	51.9
5	School Attendance	School Attendance	67.8	71.5	67.6	69.3	61.1	64.5	74.0	76.8	64.0	67.5	57.2	63.5
6	Cooking Fuel	clean fuel for cooking	19.2	34.7	22.8	33.0	18.9	31.9	27.8	40.2	29.6	40.1	31.8	41.4
7	Sanitation	Improved sanitation	30.0	60.5	34.8	76.8	25.0	56.7	52.8	68.0	34.8	65.1	46.1	77.1
8	Drinking Water	Improved drinking-water source	89.1	91.1	91.3	95.5	78.1	86.6	97.2	97.5	85.2	89.0	93.7	96.5
9	Electricity	households with electricity	86.6	97.0	96.3	98.8	81.2	94.3	94.3	97.5	90.9	98.4	91.2	98.1
10	Bank Accounts	Women having a bank or savings account	56.2	86.5	51.3	80.3	45.1	79.6	43.5	76.5	37.3	74.7	58.2	79.6

Source: Author's Calculation

Odisha and Lowest MPI States

It is very interesting to study Odisha's performance in comparison to lowest multidimensional poverty states namely Kerala, Tamil Nadu and Punjab. Though Odisha has performed well between NFHS – 4 and 5, due to historical incidence of backwardness, there is broad gap to catch up with lowest MPI states (IIPS, 2021). In Stunting Children indicator, Odisha's performance is better than Kerala, Tamil Nadu and Punjab. In Underweight Children indicator, Odisha is doing well in comparison to Kerala, Tamil Nadu and Punjab. In Women BMI indicator, Odisha's performance is ahead of Kerala, Tamil Nadu and Punjab. In Men BMI indicator, Odisha's performance is ahead of Kerala, Tamil Nadu and Punjab. In neonatal mortality rate indicator, Odisha's performance is better than Kerala and Punjab but broad gap to catch up. In infant mortality rate indicator, Odisha's performance is better than Kerala, Tamil Nadu and Punjab but broad gap to catch up. In under-five mortality rate indicator, Odisha is performing better than Kerala, Tamil Nadu and Punjab but broad gap to catch up. In at least 4 antenatal care visits of Mother indicator, Odisha's progress is noteworthy and way ahead of Kerala, Tamil Nadu and Punjab. In Institutional Birth indicator and Births attended by skilled health personnel indicator, Odisha's performance is better than Kerala,

Tamil Nadu and Punjab. In Institutional Birth indicator, Odisha's performance is better than Kerala, Tamil Nadu and Punjab. In Home births by skilled health personnel indicator, Odisha's performance is lagging behind Kerala, Tamil Nadu and Punjab. In Years of Schooling – Women indicator, Odisha is performing better than better than Kerala, Tamil Nadu and Punjab.

In Years of Schooling – Men indicator, Odisha's performance is better than Punjab and Tamil Nadu but lagging behind Kerala. In School Attendance indicator, Odisha is performing better than Kerala, Tamil Nadu and Punjab.

In Cooking Fuel indicator, Odisha's performance is better than Kerala, Tamil Nadu and Punjab. In Sanitation indicator, Odisha's performance is substantial and better than Kerala, Tamil Nadu and Punjab. In Drinking Water indicator, Odisha's performance is better Kerala, Tamil Nadu and Punjab. In Electricity indicator, Odisha's performance is substantial and better than Kerala, Tamil Nadu and Punjab. In Bank Account indicator, Odisha's performance is substantial and better than Kerala, Tamil Nadu and Punjab. Indicator wise score of Odisha and other lowest MPI states between two latest rounds of NFHS is outlined in Table 8.

Table 8   Indicator Wise Score of Odisha and Lowest MPI States between NFHS 4 and 5

	State		Odisha		Kerala		Tamil Nadu		Punjab	
Sl No	Indicator	Detailed Indicators	NHFS 4	NHFS 5	NHFS 4	NHFS 5	NHFS 4	NHFS 5	NHFS 4	NHFS 5
1	Nutrition	Stunted Children	34.1	31.0	19.7	23.4	27.1	25.0	25.7	24.5
		Underweight Children	34.4	29.7	16.1	19.4	23.8	22.0	21.6	16.9
		Women BMI	26.5	20.8	9.7	10.1	14.6	12.6	11.7	12.7
		Men BMI	19.5	15.3	8.5	10.0	12.4	12.1	10.9	12.5
2	Child & Adolescent Mortality	NNMR	28.2	27.0	4.4	3.4	14.0	12.7	21.2	21.8
		IMR	39.6	36.3	5.6	4.4	20.2	18.6	29.2	28.0
		U5MR	48.1	41.1	7.1	5.2	26.8	22.3	33.2	32.7
3	Maternal Health	Antenatal care	61.9	78.1	90.1	78.6	81.1	89.9	68.5	59.3
		Institutional births	85.3	92.2	99.8	99.8	98.9	99.6	90.5	94.3
		Skilled Home Birth	3.3	1.9	0.1	0.2	0.6	0.2	4.5	2.6
		Skilled Birth	86.5	91.8	99.9	100.0	99.2	99.8	94.1	95.6

4	Years of Schooling	Women years of schooling	26.7	33.0	72.2	77.0	50.9	56.6	55.1	56.0
		Men years of schooling	37.1	38.6	70.5	73.3	58.3	59.1	59.8	58.7
5	School Attendance	School Attendance	67.8	71.5	95.4	95.5	77.2	80.4	76.0	77.2
6	Cooking Fuel	clean fuel for cooking	19.2	34.7	57.4	72.1	73.0	82.9	65.9	76.7
7	Sanitation	Improved sanitation	30.0	60.5	98.2	98.7	52.5	72.6	82.7	86.6
8	Drinking Water	Improved drinking-water source	89.1	91.1	94.8	94.9	97.7	98.6	99.6	98.8
9	Electricity	households with electricity	86.6	97.0	99.2	99.6	99.0	99.3	99.6	99.7
10	Bank Accounts	Women having a bank or savings account	56.2	86.5	70.6	78.5	77.0	92.2	58.8	81.6

Source: Author's Computation

Conclusion

Odisha's multidimensionally poor population has declined from 29.34% in 2015-16 to 15.68% in 2019-21. Puri has lowest multidimensional poverty (3.29%) while Malkangiri has highest multidimensional poverty (45.01%). 16 districts of Odisha have lower multidimensional poverty than state average and 15 districts have lower multidimensional poverty than national average. Though there is significant reduction in multidimensional poverty still low nutrition, less access to safe cooking fuel, less sanitation coverage and less housing coverage are contributing towards 15.68% multidimensional poverty. Odisha's performance is noteworthy in comparison to neighbouring and comparable states. Though Odisha has performed well between NFHS – 4 and NFHS – 5, due to historical incidence of backwardness, there is broad gap to catch up with lowest MPI states. Odisha's poverty has precipitously decreased by 24.61 percentage points from 57.20% (2004-05) to 32.59% (2011-12). Average annual decline in poverty is 3.52 percentage points. This was highest reduction in poverty among major states in the country. The state has performed way better than nation and major states in terms of elimination of poverty over last two decades. The state has been largely successful in multidimensional development and eliminating poverty at a faster level than nation. In indicators like child & adolescent mortality, school attendance, and bank account, Odisha is one of the front runner and performing well in comparison to national average and many states in the country. Odisha has undertaken SDG Based Planning and Budgeting since 2020-21. State is putting utmost focus and allocating significant fund in concerned areas. State has achieved highest reduction in infant mortality rate and second highest reduction in maternal mortality ratio in the country. Institutional birth in Odisha is 92% which is higher than national average and among many states of the country. Data driven governance and real time monitoring of schemes and programmes will certainly be helpful in achieving required targets and objectives. Among other accomplishment in SDG, the achievements of the state is remarkable in the domain of elimination of poverty in lass two decades. Several welfare measures with targeted intervention have lead to achievement of fastest poverty reduction and state is targeting to reduce multidimensional poverty to 10% by the end of 2025 and eliminate it by 2030. Improvement in social sector indicators, elimination of all forms of poverty, hunger, malnutrition and provision of basic standards of living will lead to achievement of 2030 agenda of Sustainable Development in Odisha.

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