



RESEARCH ARTICLE

Evaluating Direct Benefit Transfer as a Policy Instrument for Achieving Sustainable Development Goals: Evidence from Uttar Pradesh

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Abstract

The current research assessed how effectively Direct Benefit Transfer (DBT) functions as a policy tool for achieving particular Sustainable Development Goals (SDGs) in Uttar Pradesh, India. The study examined four main areas, which included educational progress through SDG 4, health improvements through SDG 3, gender equality through SDG 5, and the implementation of clean energy solutions through SDG 7. The study conducted descriptive and diagnostic assessments of secondary data from 2015 to 2024 before performing econometric modeling with Firth Logit and Probit regression techniques. The study evaluated how DBT exposure affected Gross Enrolment Ratio and various health indicators, which included Infant Mortality Rate, Total Fertility Rate, Crude Death Rate, Female Literacy Rate, and PMUY (Pradhan Mantri Ujjwala Yojana) coverage. The empirical results led to the rejection of all four hypotheses because DBT showed no independent effect on any of the five measured SDG indicators during the research period. The research results show that DBT improves transparency and target efficiency and financial inclusion, but sustainable development results from the interaction between structural components, institutional elements, and socio-economic aspects. The study shows that DBT operates as a governance mechanism that enables policy development through its impact on development outcomes, which depend on policy alignment and infrastructure development and implementation methods.

Keywords: Clean Energy Adoption; Direct Benefit Transfer; Gender Equality; Health Outcomes; Sustainable Development Goals.

Introduction

The United Nations 2030 Agenda for Sustainable Development is to create 17 Sustainable Development Goals (SDGs), which serve as the foundation for unifying international economic, social, and environmental systems (Weiland *et al.*, 2021; United Nations, 2015). These SDGs have transformed sustainable development governance

through their extensive impact. Development strategy has evolved during the past ten years from its original focus on separate sector-specific actions. The Sustainable Development Goals show the essential requirement for India to develop a functioning welfare system that provides transparent operations and eliminates all operational waste. Public finance and social protection systems need to undergo fundamental changes because they play a crucial role in India's development strategy, which aims to achieve Sustainable Development Goals through its welfare programs (NITI Aayog, 2021).

India's welfare system operated through material and cash assistance, which intermediaries delivered to people who needed food security, fertilizers, fuel, education, and social assistance. India's government started the Direct Benefit Transfer (DBT) system implementation in 2013. The DBT system operates without intermediate agents, thus achieving better transparency and accountability by delivering payments straight to beneficiary bank accounts (Govt. of India, 2013; World Bank, 2022). DBT introduced a new method for distributing welfare benefits, which moved away from traditional input-controlled systems towards public financing models that focus on efficiency for service delivery.

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The Digital Banking Transfer system requires a reliable digital public infrastructure for its digital payment processing. India established this system through its JAM Trinity system, which operates with Jan Dhan accounts and Aadhaar biometric identification and mobile connection services. The systems have created pathways that allow people to access financial services. Government authorities now have the capacity to identify recipients and address complaints while conducting transfer operations and mitigating fraudulent actions and duplicate entries (Geebren *et al.*, 2021; Jadil *et al.*, 2021). The digital financial services sector demonstrates how social influence, user confidence, and safety performance expectations impact users who adopt their services (Belanche *et al.*, 2022; Wei *et al.*, 2021). DBT has reduced transaction costs, developed faster delivery times, and improved household financial resources, thereby enabling households to access financial resources during the COVID-19 crisis (Varshney *et al.*, 2021; Wang & Huang, 2021). The evaluation of DBT as a strategic tool for achieving SDG outcomes at the sub-national level needs a systematic assessment because three challenges continue to affect society: digital exclusion, gender disparities, and rural-urban divides (Tay *et al.*, 2022).

Such recurring gaps in the core SDGs highlight the need for an assessment of policy tools that could help achieve the targets in measurable terms. In this regard, the Direct Benefit Transfer (DBT) mechanism becomes extremely important as it has the potential to directly connect government spending with development indicators at the household level. This would help in reducing wastage, increasing the efficiency of targeting, and improving financial inclusion, which could help in fast-tracking progress in the areas of health, education, gender equality, and energy access. The assessment of DBT in the context of the SDG framework, therefore, offers important lessons in how digital welfare state management can help in overcoming development gaps.

Literature Review

Welfare Economics Theory, which was described by Arthur Cecil Pigou in 1920, examined the effects of economic policies on the welfare of society. The theory develops through three fundamental components, which include resolving market failures, managing externalities, and distributing income. The three areas must maintain operational efficiency standards and social equity standards to achieve optimal social welfare results. The theoretical framework establishes a normative foundation that governments can apply through cost-benefit analysis and specific transfer methods (Sunstein, 2020). Welfare economics functions through Direct Benefit Transfer (DBT) because it decreases transaction costs while increasing targeting precision and maintaining proper resource distribution.

The Systematic Transformation and New Governance Models report discussed the SDGs as development frameworks that require transformational governance models in the provided case studies to collaboratively deliver SDGs 3 (health), 4 (education), 5 (gender equality), and 7 (affordable and clean energy). These frameworks generated systematic transformation through collaboration across multiple sectors and the development of new governance models at all levels of both public and private sectors (Weiland *et al.*, 2021; Zhao *et al.*, 2022). In devising national strategies, the best policy packages and trade-offs between SDGs were identified through the use of advanced policy design tools, including simulations and artificial intelligence (Basheer *et al.*, 2022). Integrating SDGs into corporate social responsibility frameworks improved strategic alignment for organizations by establishing specific operational boundaries and measurable results (Shayan *et al.*, 2022). The COVID-19 pandemic heightened the need to address existing problems because it showed how shallow involvement and funding shortages could jeopardize unified strategic execution, which required immediate attention (Zhan & Santos-Paulino, 2021). The study results showed that SDG research mainly develops in developed countries because this research area requires international collaboration and advanced research capabilities (Heras-Saizarbitoria *et al.*, 2021; Mishra *et al.*, 2023).

The Direct Benefit Transfer (DBT) system served as a crucial component for digital welfare control because it delivered government financial assistance directly to citizens' bank accounts. The DBT system established the foundation for citizens to access digital financial services. The need for this solution arises because developing countries must overcome existing gender and wealth and urban-rural access challenges for their long-term development (Tay *et al.*, 2022). The government serves as the primary driver of digital transformation through its development of digital ecosystems, mobile payment systems, digital platforms, and digital literacy programs. All of these components are necessary for implementing DBT and the whole digital welfare governance system (Chen *et al.*, 2021). The COVID-19 pandemic created an urgent requirement for digital financial services. The study demonstrated that direct benefit payments function as essential resources for delivering critical social services during emergencies (Tay *et al.*, 2022; Cruz-Cárdenas *et al.*, 2021). Small businesses and vulnerable groups lacked both digital skills and financial resources needed to establish DBT-based charitable programs, which resulted in multiple technical difficulties (Chen *et al.*, 2021). The implementation of direct benefit transfer showed three main areas that needed digital welfare government improvement through better data system infrastructure and enhanced cooperation between various organization types (Oloyede *et al.*, 2023).

Direct Benefit Transfer (DBT) programs function as essential policy tools which help achieve multiple Sustainable Development Goals (SDGs) at the same time, yet studies show these programs produce both beneficial results and operational difficulties. DBT-based interventions in India provide evidence which demonstrates their positive effects on health outcomes. The Tuberculosis (TB) related DBT scheme decreased treatment failures by almost 80 percent to create better health results for patients who access treatment through the program which supports Sustainable Development Goal 3 (Good Health and Well-being). The program faced implementation challenges because people experienced difficulties when trying to access their bank accounts and because funds took too long to reach them (Dave & Rupani, 2022; Schraufnagel & Shete, 2023). International cash transfer programs display social and economic advantages which extend beyond their basic benefits. The Bolsa Família program in Brazil played a significant role in reducing poverty and improving human development indicators (Neves *et al.*, 2022). The program led to higher school attendance rates and better health results and new job opportunities, which helped achieve sustainable development goals for SDG 1 (No Poverty), SDG 3 (Good Health and Well-being), SDG 4 (Quality Education), and SDG 8 (Decent Work and Economic Growth) (Magalhães *et al.*, 2024).

Research Gap

The existing literature reveals that Direct Benefit Transfer (DBT) and cash transfer programs are successful in enhancing the outcomes of welfare by reducing poverty and ensuring access to healthcare and education, as well as securing the livelihoods of people (Hajdu *et al.*, 2020; Magalhães *et al.*, 2024). Various studies have explored the effectiveness of DBT in terms of its efficiency and success in achieving certain Sustainable Development Goals (SDGs) (Dave & Rupani, 2022; Varshney *et al.*, 2021). However, the existing literature has not yet established empirical relationships between DBT and SDG outcomes because there is a lack of research that explores DBT as a tool for achieving multiple SDGs at the same time (Weiland *et al.*, 2021; Mishra *et al.*, 2023). The research studies on digital welfare governance and financial inclusion require further exploration to determine their role in transforming DBT coverage into actual SDG outcomes (Tay *et al.*, 2022; Chen *et al.*, 2021). The existing gap in the literature indicates that DBT requires evaluation through a method that evaluates outcomes based on the SDG framework. To address these gaps, the following hypotheses are proposed:

- H1: There are significant patterns of student enrolment and school attendance among households with exposure to Direct Benefit Transfer (SDG 4: Education).
- H2: There is significant utilisation of selected healthcare services among beneficiaries receiving Direct Benefit Transfer (SDG 3: Health).

- H3: There are significant household-level indicators of female empowerment and educational outcomes in relation to Direct Benefit Transfer exposure (SDG 5: Gender Equality).
- H4: There is a significant household adoption of clean cooking energy sources in the context of Direct Benefit Transfer-linked schemes.

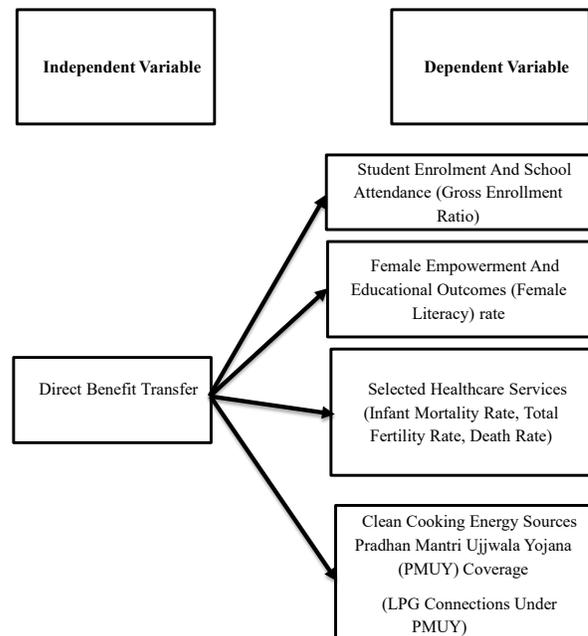
Objectives of the Study

- Obj 1: To describe patterns of student enrolment and school attendance among households with exposure to Direct Benefit Transfer (SDG 4: Education).
- Obj 2: To examine the utilisation of selected healthcare services among beneficiaries receiving Direct Benefit Transfer (SDG 3: Health).
- Obj 3: To analyse household-level indicators of female empowerment and educational outcomes in relation to Direct Benefit Transfer exposure (SDG 5: Gender Equality).
- Obj 4: To assess household adoption of clean cooking energy sources in the context of Direct Benefit Transfer-linked schemes (SDG 7: Green Energy).

Research Methodology

A conceptual framework is a formulated representation of the most significant variables and the possible assumed relationships between them. It provides the theoretical foundation for linking concepts, guiding hypothesis formulation, research design, data analysis, and facilitating the systematic and organized description of the phenomenon under investigation (Bassey *et al.*, 2022).

The present study identifies Direct Benefit Transfer (DBT)



(Source: Self-Prepared by Author)

Figure 1: Conceptual Framework

as the independent variable, as it represents the key policy intervention examined for its influence on development outcomes. The dependent variables correspond to selected indicators aligned with major Sustainable Development Goals. The Gross Enrolment Ratio provides a measure of student enrolment and school attendance. At the same time, female empowerment and educational outcomes are assessed through female literacy levels. Healthcare outcomes are measured by indicators that include Infant Mortality Rate, Total Fertility Rate, and Death Rate, and access to clean cooking energy is evaluated through Pradhan Mantri Ujjwala Yojana (PMUY) coverage and LPG connections. The variables enable researchers to assess how DBT impacts different sectors of the economy. The researchers used Firth Logit and Probit regression models to test their hypotheses, which studied how DBT affects education and health outcomes, women's empowerment, and clean energy adoption.

The study uses an explanatory micro- econometric approach along with a descriptive research design to analyze the effect of Direct Benefit Transfer on the selected Sustainable Development Goals in Uttar Pradesh. The adoption of such a method is justified as it depends on trustworthy secondary data obtained from various government websites and official reports for the period 2015 to 2024. The descriptive framework facilitates the recognition of trends and patterns. In contrast, the econometric analysis verifies the relationships proposed by the hypothesis, thus providing analytical rigor, contextual interpretation, and policy-relevant findings.

The study exclusively employs secondary data to examine how Direct Benefit Transfer systems enable Uttar Pradesh to accomplish its Sustainable Development Goals. The study required this method because it needed to evaluate institutional performance across various contexts. The study uses official government websites and reports to create time series data, which extends from 2015-2024 through the DBT Bharat Portal, UDISE+ NFHS health data, and the PMUY portal data. The data support the analysis of public policies (DBT Bharat Portal, Census Digital Library, UDISE+ and Digital Sansad).

The study examines the all the regions of Uttar Pradesh, which is located in India. The study selected Uttar Pradesh for the study because the state has a large number of residents who possess various social and economic characteristics, yet the state continues to face development challenges. The NITI Aayog SDG India Index 2.0 indicates that the state operates as a Performer due to its subpar performance in SDG 3 Health, SDG 4 Education, SDG 5 Gender Equality, and SDG 7 Clean Energy. Researchers may examine the effects of Direct Benefit Transfer on Sustainable Development Goals (NITI Aayog 2020).

The study uses various statistical methods, which help the

study conduct a complete analysis of data. The research uses Microsoft Excel for data arrangement and organization while making tables and basic charts. IBM SPSS Statistics 26 provides multiple functions, which include data entry, frequency distribution display, and percentage summary statistics generation. The results obtained from the Direct Benefit Transfer indicate different trends from 2015 to 2024. The study used two methods to carry out the analysis of the data. The study used the logit and probit models to determine the chances of attaining different Sustainable Development Goal measures. The Firth Logit model was used to carry out the study since it helps in obtaining accurate results even when there is a situation of a small sample size and rare event data, where logistic regression fails to converge or give accurate results (Puhr *et al.*, 2017; Heinze & Schemper, 2002). The probit model was used to carry out the study and test the strength of the system, where the response is assumed to be normally distributed, thus providing a different method of obtaining results. The models used to carry out the study proved that the results obtained are reliable since they were tested using different models. This indicates that the results obtained from the DBT have an impact on providing indirect welfare gains since the direct impact on the results of the SDGs depends on the structural, social, and institutional situations.

Results

Descriptive and Diagnostic Analysis

This section presents the descriptive and diagnostic analysis of the variables employed in the study. It includes descriptive statistics to summarize the central tendency and dispersion of the data, unit root tests to examine stationarity.

Table 1 presents the descriptive statistics alongside the outcomes of the unit root analyses for all variables included in the study. Direct Benefit Transfer (DBT) exhibits significant variation, which shows through its high mean value and its wide standard deviation, while Total Fertility Rate, Crude Death Rate, Infant Mortality Rate, PMUY coverage, Female Literacy Rate, and Gross Enrolment Ratio maintain their study period moderate dispersion pattern. The unit root test results show that all variables reach stationarity at the 10% significance level. Therefore, first differencing and log transformation are applied during preprocessing to ensure stationarity and improve the reliability of subsequent econometric estimations.

Table 2 presents the correlation matrix of the study's transformed variables. Direct Benefit Transfer (I_dbt) shows a weak negative correlation with Total Fertility Rate (d_tfr , -0.246), Infant Mortality Rate (d_imr , -0.246), Gross Enrollment Ratio (d_ger , -0.241), and Female Literacy Rate (d_flr , -0.250), suggesting that higher DBT disbursements are slightly associated with lower fertility, lower infant mortality, and marginally higher education outcomes.

Table 1: Descriptive Statistics and Unit Root Test Results of Study Variables

Variable	Mean	Std. Dev.	Test Statistic	P-Value	Decision Level (10%)
Direct Benefit Transfer	652799147135.00	486681883671.71	-6.319	0.0000	Reject H ₀ (Stationary)
Total Fertility Rate	2.75	0.18	-2.828	0.0543	Reject H ₀ (Stationary)
Crude Death Rate	6.70	0.25	-3.703	0.0041	Reject H ₀ (Stationary)
Infant Mortality Rate	40.20	3.08	-2.828	0.0543	Reject H ₀ (Stationary)
(PMUY) Coverage	11811279.00	7507297.92	-2.828	0.0543	Reject H ₀ (Stationary)
Female Literacy Rate	60.65	2.79	-4.287	0.0005	Reject H ₀ (Stationary)
Gross Enrolment Ratio	79.04	10.39	-2.828	0.0543	Reject H ₀ (Stationary)

Table 2: Correlation Matrix

	<i>l_dbt</i>	<i>d_tfr</i>	<i>d_cdr</i>	<i>d_imr</i>	<i>d_pmuy</i>	<i>d_ger</i>	<i>d_flr</i>
<i>l_dbt</i>	1						
<i>d_tfr</i>	-0.2455*	1					
<i>d_cdr</i>	0.3404*	-0.0693*	1				
<i>d_imr</i>	-0.2455*	1***	-0.0693*	1			
<i>d_pmuy</i>	0.0793*	0.125*	0.0693*	0.125*	1		
<i>d_ger</i>	-0.241*	-0.125*	0.5547*	-0.125*	0.125*	1	
<i>d_flr</i>	-0.2495*	-0.433*	0*	-0.433*	-0.433*	0.433*	1

DBT is positively correlated with Crude Death Rate (*d_cdr*, 0.340) and PMUY coverage (*d_pmuy*, 0.079), though these relationships are weak. Overall, the correlations indicate minor associations between DBT and key health, education, and gender indicators, while structural and socio-economic factors are likely more influential.

Hypothesis Wise Results

H1: There are significant patterns of student enrolment and school attendance among households with exposure to Direct Benefit Transfer (SDG 4: Education).

Table 3 shows the results of Firth Logit and Probit regression analysis, which studies how Direct Benefit Transfer (DBT) affects Gross Enrollment Ratio (GER). The models show that DBT coefficients produce positive results through both models because Firth Logit gives 0.183 and Probit shows 1.567. However, the results lack statistical significance because both p-values show values above 0.5, which exceeds standard significance thresholds of 5 per cent and 10 per cent. The model’s total significance testing shows weak results because of a high Prob > chi² value at 0.798 and a low Pseudo R² value at 0.155. DBT exposure leads to student enrollment and school attendance patterns that exist independently of its effects. The H1 is rejected. Educational outcomes depend more on structural and socio-economic factors, which include school infrastructure and school accessibility together with parental awareness and educational quality, than they depend on financial transfers that people receive directly.

H2: There is significant utilisation of selected healthcare

services among beneficiaries receiving Direct Benefit Transfer (SDG 3: Health).

Table 4 shows the combined Firth Logit and Probit regression results, examining the impact of Direct Benefit Transfer (DBT) on Total Fertility Rate, Crude Death Rate, and Infant Mortality Rate. The DBT coefficients show no statistical significance across all situations because the p-values exceed standard levels of significance. The coefficients display mixed directional patterns because their estimated effects lack empirical significance. The model shows weak results through high Prob greater than chi-square values and very low pseudo R-squared statistics, which demonstrate limited explanatory power. The results demonstrate that DBT lacks any significant statistical effect on the health indicators. Therefore, the H2 is rejected, implying that healthcare utilisation and related health outcomes are influenced more by structural and socio-economic factors than by direct financial transfers alone during the study period.

H3: There are significant household-level indicators of

Table 3: Firth Logit and Probit Regression Results

<i>Dependent Variable: Gross Enrollment Ratio</i>				
Model Type	Variable	Coefficient	Std. Error	P-Value
Firth Logit	Direct Benefit Transfer	0.183	0.717	0.798
Penalized log likelihood = -2.848		Prob > chi2 =		0.798
Probit	Direct Benefit Transfer	1.567	3.318	0.637
Log likelihood = -2.650		Pseudo R2 = 0.155		

Table 4: Firth Logit and Probit Regression Results

<i>Independent Variable: Direct Benefit Transfer</i>						
<i>Dep. Var.</i>	<i>Model</i>	<i>Coef.</i>	<i>Std. Err.</i>	<i>P-Value</i>	<i>Log Lik.</i>	<i>Prob > χ^2 / Pseudo R²</i>
Total Fertility Rate	Firth Logit	0.191	0.723	0.792	-2.846	0.791
	Probit	1.922	4.209	0.648	-2.605	0.170
Crude Death Rate	Firth Logit	-0.118	0.512	0.818	-4.852	0.818
	Probit	-0.063	0.371	0.865	-5.714	0.002
Infant Mortality Rate	Firth Logit	0.191	0.722	0.792	-2.846	0.791
	Probit	1.922	4.209	0.648	-2.605	0.170

female empowerment and educational outcomes in relation to Direct Benefit Transfer exposure (SDG 5: Gender Equality).

Table 5 presents Firth Logit and Probit regression analysis results, which investigate Direct Benefit Transfer (DBT) impact on Female Literacy Rate. The DBT coefficients show positive results for both models because Firth Logit model shows 0.459 and the Probit model shows 0.360. The results lack statistical significance because both p-values (0.382 and 0.345) exceed the 5 per cent and 10 per cent significance thresholds. The model shows low overall significance because it has a high Prob > χ^2 value of 0.381 and a low Pseudo R² value of 0.0799. The evidence shows DBT fails to produce any measurable effects on female literacy and empowerment. The H3 is rejected, direct financial transfers do not determine female educational results, which instead depend on structural and socio-economic factors that include school access, gender norms and household awareness.

H4: There is a significant household adoption of clean cooking energy sources in the context of Direct Benefit Transfer-linked schemes.

Table 6 shows the Firth Logit and Probit regression results, which investigate how DBT affects PMUY coverage, which serves as a measure of clean cooking energy adoption. The DBT coefficients show a negative value of -0.055 in Firth Logit and a positive value of 0.151 in Probit, but both results lack statistical significance because their p-values exceed 0.932 and 0.798. The model shows very weak performance because its Prob > χ^2 value reaches 0.9318, and its Pseudo R² value drops to 0.011. The results demonstrate that DBT lacks any important effect on household usage of clean cooking energy. H4 is rejected, indicating that Direct Benefit Transfer alone does not significantly influence household adoption of clean cooking energy. The findings highlight that adoption patterns are primarily determined by scheme implementation, household awareness, and infrastructure availability, emphasizing that financial transfers must be complemented with proper program delivery and support measures to achieve meaningful uptake.

Table 5: Firth Logit and Probit Regression Results

<i>Dependent Variable: Female Literacy Rate</i>				
<i>Model Type</i>	<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>P-Value</i>
Firth Logit	Direct benefit Transfer	0.459	0.525	0.382
Penalized log likelihood = -4.482		Prob > chi2 =	0.381	
Probit	Direct Benefit Transfer	0.360	0.382	0.345
Log likelihood = -5.2711601		Pseudo R2 =	0.0799	

Table 6: Firth Logit and Probit Regression Results

<i>Dependent Variable: Pradhan Mantri Ujjwala Yojana (PMUY) Coverage</i>				
<i>Model Type</i>	<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>P-Value</i>
Firth Logit	Direct benefit Transfer	-0.055	0.645	0.932
Penalized log likelihood = -2.8799481		Prob > chi2 =	0.9318	
Probit	Direct benefit Transfer	0.151	0.592	0.798
Log likelihood = -3.103		Pseudo R2 =	0.011	

Discussion

The analysis results showed Direct Benefit Transfer (DBT) achieved a mean value of ₹ 652799147135 for total transfers, which had a standard deviation of ₹ 486681883671.71, showing differences between 2015 and 2024 across Uttar Pradesh. The SDG indicators, which included Gross Enrolment Ratio (mean = 79.04), Female Literacy Rate (mean = 60.65), Infant Mortality Rate (mean = 40.20), and PMUY coverage (mean = 11,811,279), showed low variation in their results. The unit root tests established that the data maintained stationarity at the 10% threshold through the DBT test statistic = -6.319, p = 0.0000; Female Literacy Rate = -4.287, p = 0.0005, results, which enabled the study to use transformed variables in their regression analysis. The testing of hypotheses proved that DBT failed to show any impact on the SDG results. The Firth Logit coefficient for H1 (SDG 4: Education) showed insignificance through its value of 0.183, and the Probit coefficient showed insignificance

through its value of 1.567, with $\text{Prob} > \chi^2$ showing a value of 0.798 and Pseudo R^2 showing a value of 0.155, which led to H1 rejection. The H2 (SDG 3: Health) testing showed that DBT failed to show significant impacts on Total Fertility Rate results ($p = 0.792$; 0.648), Crude Death Rate results ($p = 0.818$; 0.865), and Infant Mortality Rate results ($p = 0.792$; 0.648) because the testing resulted in weak model results, which led to H2 rejection. The H3 (SDG 5: Gender Equality) testing showed that, despite positive coefficients of 0.459 and 0.360, the testing proved H3 rejection through high p-values of 0.382 and 0.345 and $\text{Prob} > \chi^2$ of 0.381 and a Pseudo R^2 of 0.0799. The H4 (SDG 7: Clean Energy) testing showed rejection because the testing demonstrated no significant results through its coefficient values of -0.055 with $p = 0.932$ and 0.151 with $p = 0.798$, which produced extremely high $\text{Prob} > \chi^2$ results of 0.9318 and very low Pseudo R^2 outcomes of 0.011. The findings showed that DBT expansion failed to create any significant improvements in educational, health, gender equality, Clean Cooking Energy Sources Pradhan Mantri Ujjwala Yojana (PMUY) Coverage. The primary drivers of SDG performance remain structural and institutional and socio-economic factors.

The growth in the mean value of Direct Benefit Transfer in Uttar Pradesh can be attributed to the expansion of welfare schemes, increased beneficiary coverage, improvements in digital financial infrastructure, and the integration of the JAM framework that enables efficient fund transfers. Additionally, large sectoral payments such as agricultural subsidies and farmer payments have significantly increased total DBT disbursements. Meanwhile, the standard deviation of DBT reflects the variability in welfare transfers over time; a high standard deviation indicates fluctuations in benefit distribution and unequal access, whereas a low standard deviation suggests stable and predictable welfare support for beneficiaries.

The Direct Benefit Transfer program in Uttar Pradesh has achieved major growth through three factors which include better digital systems and Aadhaar-linked banking services and the establishment of a single system to distribute multiple welfare programs. The programs which include PM-KISAN and scholarships and pensions and LPG subsidies create substantial financial assistance for beneficiaries as shown by the high average DBT value. The high standard deviation shows that disbursements experienced major fluctuations between different years because of changes in policies and the growth of programs and the emergency distribution of funds during events like the COVID-19 pandemic. Uttar Pradesh provides Direct Benefit Transfer services to more recipients than most other Indian states which has resulted in decreased program losses while creating substantial financial benefits for the government.

The theory of Sustainable Development showed the interconnectedness of social, economic, and environmental

development goals. Past research showed the potential of Direct Benefit Transfer to achieve the Sustainable Development Goals in the achievement of SDG 4, SDG 3, SDG 5, and SDG 7. However, the results showed that the Direct Benefit Transfer was not statistically significant in the achievement of the SDGs, although the coefficients were positive. This showed the gradual effects of the Direct Benefit Transfer in the achievement of the SDGs. Although the Welfare Economics Theory showed that the Direct Benefit Transfer can improve the financial condition of people, the results showed that the effects depend on institutional support, infrastructure, and awareness, which complement the financial support of the Direct Benefit Transfer to achieve developmental results. Although the previous research of Biswas and Das (2021) and Mazorra *et al.* (2019) showed the benefits of the Direct Benefit Transfer, such as the benefits of social protection and the benefits of clean and sustainable energy, the results showed the importance of implementation systems of the Direct Benefit Transfer to show the benefits of the Direct Benefit Transfer, such as the benefits of education and the benefits of empowering women. Although the theories showed the importance of the Direct Benefit Transfer, the results showed the importance of adjustments to the Direct Benefit Transfer to accurately show the effects of the Direct Benefit Transfer in the achievement of the SDGs. Although the Direct Benefit Transfer showed the potential to achieve the SDGs, the results showed that the Direct Benefit Transfer was not effective in the achievement of developmental results, although adjustments can improve the efficiency of the Direct Benefit Transfer.

DBT programs, which provide financial support directly to beneficiaries through their programs, achieve mixed effectiveness in improving educational outcomes and healthcare results. The disability-targeted cash transfer program in China established higher school attendance rates, which decreased financial obstacles to educational and medical services while increasing medical and educational access for program participants (Wang *et al.*, 2022). Cash transfers in humanitarian contexts showed mixed results because research demonstrates positive effects in some studies, whereas other research showed no effect or negative results, which creates a need for research that analyzed specific local conditions (Van Daalen *et al.*, 2022). The Direct Benefit Transfer program in India increased tuberculosis treatment completion rates. In contrast, patients who did not receive benefits faced negative consequences because program staff and patients reported that cash assistance provided through the program did not meet their needs for food. Furthermore, Direct Benefit Transfer failed to provide enough support for patients to access healthcare services (Dave & Rupani, 2022). The absence of distinct student enrollment patterns and healthcare service

utilization among specific Direct Benefit Transfer recipients results from various reasons, including inadequate transfer amounts and implementation obstacles, which include missing bank accounts and systemic problems that impact service delivery and accessibility (Dave & Rupani, 2022; Maphumulo & Bhengu, 2019). The Direct Benefit Transfer program enables some people to overcome financial obstacles, which increases their ability to access services, but its success depends on both the transfer amount and the need for additional help, and the need to solve existing problems in educational institutions and healthcare facilities (Maphumulo & Bhengu, 2019).

Direct Benefit Transfer (DBT) programs show insufficient evidence of generating major improvements in female empowerment and educational outcomes at the household level. Research indicates that women who use clean cooking fuels experience higher levels of empowerment, but results vary across countries and contexts, demonstrating that DBT needs additional programs to bring about real empowerment and educational improvements (Odo *et al.*, 2021; Chandrasekaran *et al.*, 2023). Educational outcomes for girls improve when they have access to clean cooking fuels because the fuel saves time, which otherwise limits their school attendance, but this connection occurs only when clean energy is fully adopted, not through DBT exposure (Biswas & Das, 2021; Petrokofsky *et al.*, 2021). Tsekane *et al.* (2024) conducted a study in sub-Saharan Africa that demonstrated that electricity access improved women's health and educational outcomes, while access to clean cooking fuels delivered only health benefits. The low adoption rate of clean cooking energy in households occurs because DBT schemes do not address social norms, infrastructure, and affordability, which cash transfers fail to address (Odo *et al.*, 2021; Chandrasekaran *et al.*, 2023). The combination of DBT programs with focused energy access, gender norms, and education quality policies is necessary to achieve substantial advancements in women's empowerment and sustainable energy use (Odo *et al.*, 2021; Chandrasekaran *et al.*, 2023).

Implications of the Study

The current research study advances academic knowledge by providing empirical evidence on how Direct Benefit Transfer (DBT) functions within the Sustainable Development Goal (SDG) system. The study demonstrates that research models need to include structural, institutional, and socioeconomic elements because these factors help researchers better understand indirect and long-term welfare effects through multiple research methods and time-based approaches. The research shows that financial inclusion mechanisms do not produce measurable development results for sustainable enterprises and socially responsible organizations until they receive additional investments in infrastructure development, public awareness campaigns, and operational

delivery system development. Implementing financial transfers into actual Sustainable Development Goal results requires a partnership among the government, the private sector, and civil society organizations. The research demonstrates that DBT-linked programs need three key elements, including implementation through convergence methods, development of institutional capacity, and design of specific awareness programs to improve their effectiveness, according to development practitioners and policymakers. Digital transfer systems serve as operational tools for organizations, but their development results depend on the establishment of extensive structural support systems.

Conclusion

The present study examined Direct Benefit Transfer (DBT) as a policy instrument for advancing selected Sustainable Development Goals (SDGs) in Uttar Pradesh, focusing on education (SDG 4), health (SDG 3), gender equality (SDG 5), and clean energy adoption (SDG 7). The study used descriptive analysis and econometric models, including Firth Logit and Probit regression, to evaluate the effect of DBT exposure on the Gross Enrolment Ratio and selected health indicators, including Infant Mortality Rate, Total Fertility Rate, Crude Death Rate, Female Literacy Rate, and PMUY coverage. Diagnostic tests confirmed data stationarity and model suitability, yet the empirical results showed that all four hypotheses had to be rejected.

The results indicate that DBT, during the study period 2015–2024, did not produce measurable progress for the selected SDG indicators. The research results demonstrate that financial transfers are insufficient resources, requiring additional support to achieve complex development outcomes. The educational system depends on three factors, namely school infrastructure and accessibility and institutional quality. Public health systems and service delivery determine health outcomes, and gender equality depends on sociocultural norms and public awareness. Clean energy adoption requires both infrastructure and sustained use.

The Department of Basic Education should be understood as a governance system that enables government organizations to disclose their financial activities, achieve operational efficiency, and support financial accessibility for people who need it. The study shows that progress toward sustainable development goals requires both digital financial aid and the establishment of institutional frameworks, physical infrastructure, and public awareness of these requirements. The long-term impact of direct benefit transfer programs on sustainable development goals needs to be assessed through their implementation within a comprehensive development system that includes multiple sectors.

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