pISSN: 2971-6195 eISSN: 2971-6209

# EXAMINING THE ROLE OF FINANCIAL TECHNOLOGY IN ALLEVIATING POVERTY: EMPIRICAL EVIDENCE FROM NIGERIA

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## ABSTRACT

Poverty remains a persistent global challenge, with significant implications for health, living standards, and economic stability. In Nigeria, over 40% of the population lives in poverty, underscoring the urgent need for innovative solutions. Financial technology (fintech) has emerged as a transformative tool in enhancing financial inclusion and reducing poverty. However, limited empirical research exists on its impact in Nigeria. This study investigates the relationship between fintech adoption and poverty reduction, employing multiple linear regression analysis on data from 1993 to 2020 sourced from the National Bureau of Statistics and the Central Bank of Nigeria. Key variables include poverty rate, fintech innovation, literacy rate, mortality rate, and gross domestic product (GDP). The findings reveal a significant negative relationship between fintech innovation and poverty rate, indicating that fintech contributes to poverty alleviation. Conversely, literacy rate, mortality rate, and GDP exhibit insignificant effects on poverty reduction. The study highlights the importance of expanding digital infrastructure, enhancing fintech education, and implementing regulatory reforms to foster financial inclusion. These insights provide valuable policy recommendations for leveraging fintech to combat poverty in Nigeria and similar developing economies.

**Keywords**: Fintech, poverty reduction, financial inclusion, Nigeria, economic development.
**JEL**: O1, O10, O30, M13 and M15

## INTRODUCTION

Poverty remains one of the most persistent and complex challenges facing developing economies in the 21st century. Its multidimensional nature appears in limited access to basic necessities, including healthcare, education, nutrition, and financial services, creating ongoing cycles of deprivation and inequality. The global poverty landscape has seen significant shifts geographically in recent decades, with Sub-Saharan Africa becoming the center of extreme poverty. According to World Bank estimates (2020), approximately 40% of Nigeria's population—more than 83 million people—lived below the poverty line as of 2020, with projections suggesting this could rise to over 90 million in the next five years. This concerning trend continues despite Nigeria's status as Africa's largest economy and oil producer, highlighting the paradoxical coexistence of resource wealth and widespread economic hardship.

The Nigerian poverty crisis reflects broader systemic failures in economic governance and financial inclusion. Conventional financial institutions have historically failed to serve low-income populations due to stringent collateral requirements, bureaucratic hurdles, and geographical inaccessibility, particularly in rural areas (Ojiagu et al., 2020). This financial exclusion exacerbates poverty by limiting opportunities for savings, access to credit, and entrepreneurial development—key drivers of economic mobility. Furthermore, poverty's spillover effects extend beyond material deprivation, contributing to elevated mortality rates, educational disparities, and social instability (NBS, 2020). Traditional poverty alleviation strategies, ranging from government welfare programs to international aid initiatives, have achieved limited success, underscoring the need for innovative, scalable solutions.

Financial technology (fintech) has emerged as a disruptive force with transformative potential for poverty reduction. Defined as the integration of technology into financial services (Leong & Sung, 2018), fintech encompasses mobile banking, digital payments, peer-to-peer lending, and blockchain-based solutions. Its rapid adoption across developing economies stems from its ability to overcome traditional banking barriers: mobile penetration exceeds formal bank account ownership in Nigeria (CBN, 2020), while digital platforms reduce transaction costs and expand service reach. Empirical evidence from other contexts demonstrates that fintech has poverty-alleviating effects. In China, digital finance reduced rural poverty by 14% through improved credit access (Chen & Zhao, 2021), while India's fintech sector enhanced financial inclusion by 27% among marginalized groups (Gautam et al., 2021). However, Nigeria's fintech-poverty nexus remains underexplored despite the sector's explosive growth—over 200 active fintech firms generated $536 million in investments in 2021 alone (NIBSS, 2021).

This study addresses critical gaps in both academic literature and policy discourse. While existing research predominantly examines fintech's macroeconomic impacts (e.g., GDP growth, banking sector stability), few studies investigate its micro-level poverty reduction mechanisms in African contexts. Moreover, Nigeria's unique socioeconomic landscape—characterized by rapid urbanization, a large informal sector, and infrastructural deficits—necessitates context-specific analysis. Previous works have also overlooked the interplay between fintech adoption and ancillary factors, such as digital literacy and mortality rates, creating an incomplete picture of its poverty-alleviating potential. Our research fills these voids by employing a holistic analytical framework that evaluates fintech alongside key human development indicators.

Methodologically, this paper advances existing scholarship through its longitudinal design and robust econometric approach. We analyze 31 years of data (1993–2020) from Nigeria's National Bureau of Statistics and Central Bank, employing multiple linear regression to isolate the impact of fintech while controlling for literacy rates, mortality rates, and fluctuations in GDP. This extended timeframe captures Nigeria's digital transition period, including the 2012–2016 fintech boom and subsequent regulatory developments. Our model incorporates logarithmic transformations to normalize data distributions and employs diagnostic tests (e.g., multicollinearity checks, heteroskedasticity corrections) to ensure statistical rigor—a methodological improvement over prior cross-sectional studies in this domain.

The study's findings carry significant theoretical and practical implications. At the conceptual level, we contribute to the evolving "fintech for development" paradigm by demonstrating how digital financial innovations interact with traditional poverty determinants. Our results challenge conventional wisdom about poverty drivers in Nigeria, revealing that fintech has an outsized influence compared to established factors such as GDP growth. For policymakers, the research provides actionable insights: (1) prioritizing digital infrastructure investments, particularly in underserved regions; (2) integrating fintech education into national literacy programs; and (3) designing regulatory frameworks that balance innovation with consumer protection. These recommendations align with the United Nations Sustainable Development Goals (SDGs), particularly SDG 1 (No Poverty) and SDG 9 (Industry, Innovation, and Infrastructure).

Structurally, this paper proceeds as follows: Section 2 reviews theoretical foundations and empirical literature, Section 3 details methodology and data sources, Section 4 presents results and discussion, and Section 5 concludes with policy implications. By systematically examining fintech's role in poverty reduction, this study aims to inform academic discourse and guide Nigeria's inclusive development strategies in the digital age.

## LITERATURE REVIEW

Theoretical framework

This study is grounded in three complementary theoretical frameworks that explain the fintech poverty reduction nexus:

Financial inclusion theory (Demirgüç-Kunt & Klapper, 2012)

Postulates that access to affordable financial services enables poverty alleviation through:

- Enhanced savings mechanisms
- Improved credit access for microenterprises
- Secure transaction platforms

Fintech expands inclusion by overcoming geographic and bureaucratic barriers inherent in traditional banking systems.

Technological diffusion theory (Rogers, 2003)

Explains how fintech innovations spread through populations, emphasizing:

- Relative advantages over existing systems
- Compatibility with local contexts
- Observability of benefits

The theory suggests that fintech adoption follows an S-curve pattern, with early adopters influencing broader population segments.

Poverty trap theory (Azariadis & Stachurski, 2005)

Posits that poverty becomes self-reinforcing due to:

- Limited access to capital
- Low productivity investments
- Constrained human capital development

Fintech may break this cycle by providing tools for asset accumulation and income generation.

Empirical review

A growing body of research has examined the relationship between financial technology and poverty alleviation across different economic contexts. Asongu et al. (2018) conducted a comprehensive cross-country study analyzing mobile banking's impact on inclusive development across 93 developing nations. Their findings revealed that mobile-based financial services significantly reduced income inequality in upper-middle-income countries (coefficient = -0.34, $p<0.01$), particularly through bill payments and money transfer functionalities. This suggests that fintech's poverty-reduction effects may vary according to national development levels.

The Asian context offers particularly relevant insights for Nigeria's experience. Gautam et al. (2021) examined fintech's potential to reduce poverty across 22 Indian states from 2018 to 2020, using advanced moderation analysis techniques. Their findings showed that while digital financial services helped decrease poverty ($\beta = -0.27$) and promote economic stability, the effects varied across different fintech applications. Payment systems had a stronger impact than lending

platforms, emphasizing the importance of distinguishing between fintech subsectors in policymaking. China's experience offers valuable lessons in rural poverty reduction through digital finance. Chen and Zhao (2021) analyzed household-level data from the China Household Finance Survey, demonstrating that digital financial inclusion reduced both absolute and relative poverty measures by approximately 14 percentage points. Their robustness tests confirmed these effects were particularly pronounced for agricultural households and female-headed households, suggesting fintech can help address intersectional poverty dimensions.

At the regional level, Emara and Mohieldin's (2021) study of 57 African and Middle Eastern countries identified two key findings. First, fintech adoption significantly contributed to reducing poverty (elasticity = -0.18) when paired with improvements in governance. Second, the study revealed threshold effects, where the impact of fintech became noticeable only after mobile penetration exceeded 60%. These results highlight the need for investments in institutional quality and digital infrastructure to maximize benefits.

However, some studies offer more nuanced perspectives. Guo and Shen's (2016) longitudinal analysis of Chinese banks showed a U-shaped relationship between fintech adoption and financial stability. While initial fintech integration lowered management costs and risks, too much technological complexity eventually raised systemic vulnerabilities. This highlights the need for balanced regulatory approaches as Nigeria's fintech sector develops.

Despite these valuable insights, significant gaps still exist in understanding how fintech helps alleviate poverty in Sub-Saharan Africa. First, most studies mainly focus on middle-income Asian economies, with little attention to the high-poverty African contexts. Second, the majority of research looks at short-term effects (3-5 years), neglecting longer-term developmental impacts. Third, few studies combine health and education metrics when examining fintech and poverty relationships. This study aims to fill these gaps by focusing specifically on Nigeria's unique economic and demographic setting, using a 31-year longitudinal framework (1993-2020), including mortality and literacy rates as key moderating variables, and utilizing actual transaction data instead of adoption proxies.

Hypotheses

Based on the foregoing empirical review and Nigeria's specific conditions, we formulate four testable hypotheses:

$H_1$: Increased financial technology adoption in Nigeria will significantly decrease poverty rates.

$H_2$: Higher literacy rates in Nigeria will strengthen the negative relationship between fintech adoption and poverty rates.

$H_3$: Elevated mortality rates in Nigeria will significantly increase poverty rates.

$H_4$: A Higher gross domestic product in Nigeria will significantly decrease poverty rates.

These hypotheses will be tested using Nigeria-specific data in the upcoming empirical analysis section, providing new evidence on digital pathways for poverty reduction in Africa's largest economy.

## METHODOLOGY

This study uses an econometric framework to examine the link between financial technology adoption and poverty reduction in Nigeria from 1991 to 2021. Building on Appiah-Otoo and Song's (2021) model, we apply a logarithmic transformation to stabilize variance and enhance estimation efficiency.

$$\ln POVR_t = \alpha + \beta_1 \ln FI_t + \beta_2 \ln MTR_t + \beta_3 \ln LTR_t + \beta_4 \ln GDP_t + \varepsilon_t$$

Where:

- lnPOVR: Natural log of poverty rate
- lnFI: Natural log of fintech innovation index
- lnMTR: Natural log of mortality rate
- lnLTR: Natural log of literacy rate
- lnGDP: Natural log of gross domestic product
- ε: Error term
- t: Time dimension (1993-2020)

The model utilizes multiple linear regression with common effects, drawing on annual time-series data from Nigeria's National Bureau of Statistics and Central Bank of Nigeria. Following Maddala's (2001) approach, we implement several diagnostic tests, including:

1. Unit root tests (ADF Fisher)
2. Multicollinearity assessment (VIF)
3. Structural break tests (Chow)
4. Heteroskedasticity evaluation (Breusch-Pagan-Godfrey)

## DATA ANALYSIS, RESULTS AND DISCUSSIONS

Data Analysis

**Table 1:** Descriptive Statistics of Key Variables (1993-2020)

| Variable | Mean | Median | Maximum | Minimum | Std. Dev. | Observations |
|---|---|---|---|---|---|---|
| Poverty Rate | 0.507 | 0.530 | 0.669 | 0.368 | 0.099 | 31 |
| Fintech Index | 0.168 | 0.148 | 0.249 | 0.085 | 0.055 | 31 |
| Literacy Rate | 0.574 | 0.552 | 0.702 | 0.511 | 0.042 | 31 |
| Mortality Rate | 0.094 | 0.095 | 0.126 | 0.058 | 0.023 | 31 |
| GDP Growth | 0.041 | 0.042 | 0.153 | -0.020 | 0.038 | 31 |

Source: Author's Computation, 2021

Table 1 presents the descriptive statistics and it reveals several key characteristics of Nigeria's

development indicators:

1. Poverty rates averaged 50.7% (range: 36.8%-66.9%)
2. Fintech adoption showed a mean penetration of 16.8% (max: 24.9%)
3. Literacy rates averaged 57.4% (range: 51.1%-70.2%)
4. GDP growth averaged 4.1% (range: -2.0% to 15.3%)

All variables exhibited standard deviations below mean values, indicating normally distributed data without outlier distortions.

Table 2: Multiple Regression Analysis of Fintech's Impact on Poverty Reduction

| Statistic | Value | Variable | Coefficient | Std. Error | t-value | p-value |
|---|---|---|---|---|---|---|
| **R-squared** | 0.814 | Constant | 0.265 | 0.437 | 0.607 | 0.549 |
| **Adj. R-squared** | 0.786 | Fintech (FI) | -0.177** | 0.069 | -2.555 | 0.017 |
| **F-statistic** | 28.53*** | Literacy | -0.207 | 0.174 | -1.194 | 0.243 |
| **Prob(F-statistic)** | 0.000 | Mortality | 0.090 | 0.101 | 0.891 | 0.381 |
| **Durbin-Watson** | 2.010 | GDP | 0.409 | 0.219 | 1.867 | 0.232 |
| **Observations** | 31 | | | | | |

**Source:** Author's Computation, 2021 *** p<0.01, ** p<0.05, * p<0.10

Table 2 presents multiple regression results. From the result, the regression model demonstrates strong explanatory power, with an $R^2$ of 0.814, indicating that the combined effect of fintech adoption, literacy rates, mortality rates, and GDP growth explains 81.4% of the variation in poverty rates. This excellent model fit is further supported by the highly significant F-statistic ($F = 28.53$, $p < 0.001$), which confirms the joint significance of all explanatory variables. Diagnostic checks reveal no autocorrelation concerns (Durbin-Watson = 2.24) or multicollinearity issues (all VIFs < 10), validating the model's statistical robustness. The estimated regression equation is:

$$POVR = 0.265 - 0.177*lnFI + 0.090*lnMTR - 0.207*lnLTR + 0.409*lnGDP + \varepsilon$$

With specific interpretation:

Fintech-poverty relationship ($H_1$ Supported)

- **Result**: Significant negative coefficient ($\beta = -0.177$, $p = 0.017$)

Each 10% increase in fintech adoption is associated with a 1.77% reduction in poverty rates, confirming $H_1$. This aligns with Financial Inclusion Theory, demonstrating how digital financial services break poverty traps by improving credit access (Demirgüç-Kunt & Klapper, 2012). The effect size compares favorably to Chen & Zhao's (2021) findings in China (-1.4% per 10% fintech increase).

Literacy's moderating role ($H_2$ Not Supported)

- **Result**: Insignificant negative coefficient ($\beta = -0.207$, $p = 0.243$)

While directionally correct, literacy lacks statistical significance in moderating fintech's effects, rejecting $H_2$. This contrasts with Emara &Mohieldin's (2021) MENA/SSA findings, suggesting Nigeria's educational quality may not yet enable effective fintech utilization. The -0.207 coefficient implies potential threshold effects not captured in the linear specification.

Health-poverty link ($H_3$ Partially Supported)

- **Result**: Positive but insignificant coefficient ($\beta = 0.090$, $p = 0.381$)

The directional support for $H_3$ (mortality-poverty connection) lacks statistical significance. This may reflect measurement limitations - the study uses aggregate mortality rather than health expenditure data. The 0.090 coefficient suggests each 1% mortality increase is associated with a 0.09% poverty rise, consistent with WHO (2020), but needing micro-level verification.

Growth-poverty paradox ($H_4$ Rejected)

- **Result**: Insignificant positive coefficient ($\beta = 0.409$, $p = 0.232$)

Contrary to $H_4$, GDP growth shows no significant poverty reduction effect, highlighting Nigeria's growth inequality problem (NBS, 2021). The positive sign suggests growth benefits may concentrate in non-poor sectors, consistent with Azariadis& Stachurski's (2005) poverty trap theory.

Table 3: Augmented Dickey-Fuller (ADF) Stationarity Test

| Variable | ADF Statistic | p-value | Lag Order | Conclusion |
|---|---|---|---|---|
| lnPOVR | -4.217** | 0.002 | 1 | Stationary |
| lnFI | -3.891* | 0.018 | 0 | Stationary |
| lnMTR | -5.032*** | 0.000 | 1 | Stationary |
| lnLTR | -3.456* | 0.013 | 0 | Stationary |
| lnGDP | -4.768*** | 0.001 | 1 | Stationary |

**Source:** Author's Computation, 2021
*** p<0.01, ** p<0.05, * p<0.1

Table 3 presents the stationarity tests results. The results confirm that all variables became stationary after first-differencing, with each series rejecting the null hypothesis of unit roots at

conventional significance levels ($p<0.10$). The ADF test results show particularly strong stationarity for mortality rates ($p=0.000$) and GDP growth ($p=0.001$), while poverty rates and fintech adoption also demonstrate clear stationary patterns ($p=0.002$ and $p=0.018$, respectively).

Table 4: Johansen Cointegration Test Results

| Hypothesis | Trace Statistic | 5% Critical Value | Max-Eigen Statistic | 5% Critical Value | Conclusion |
|---|---|---|---|---|---|
| r = 0* | 78.34 | 69.82 | 42.16 | 33.88 | Cointegrated |
| r ≤ 1 | 36.18 | 47.86 | 20.73 | 27.58 | - |
| r ≤ 2 | 15.45 | 29.80 | 10.12 | 21.13 | - |
| r ≤ 3 | 5.33 | 15.49 | 5.33 | 14.26 | - |

**Source:** Author's Computation, 2021

The Johansen cointegration test in Table 4 reveals one statistically significant long-run equilibrium relationship among the variables (r = 0 rejected at the 5% level), as both the trace statistic (78.34 > 69.82) and the max-eigen statistic (42.16 > 33.88) exceed their critical values. This finding indicates that while the individual variables are I(1) and were differenced for stationarity, their linear combination exhibits mean-reverting behavior, suggesting an underlying long-term relationship between poverty rates, fintech adoption, literacy rates, mortality rates, and GDP growth in Nigeria.

Table 5: Multicollinearity diagnostic test results

| Variable | Centered VIF | Uncentered VIF | Tolerance (1/VIF) |
|---|---|---|---|
| **Fintech (FI)** | 8.07 | 247.09 | 0.124 |
| **Mortality (MTR)** | 7.08 | 587.87 | 0.100 |
| **Literacy (LTR)** | 2.14 | 140.83 | 0.468 |
| **GDP** | 1.01 | 2.19 | 0.987 |
| **Model Average** | 5.30 | - | 0.420 |

**Source:** Author's Computation, 2021

The multicollinearity diagnostics confirm that the regression model does not suffer from harmful

multicollinearity, ensuring the reliability of the estimated coefficients. While the Variance Inflation Factor (VIF) values for **Fintech (FI) (8.07)** and **Mortality Rate (MTR) (7.08)** indicate moderate correlation among predictors, they remain below the critical threshold of 10, suggesting that multicollinearity does not significantly distort the regression results. The **Literacy Rate (LTR) (2.14)** and **GDP (1.01)** exhibit low VIF values, reinforcing their independence in the model. Tolerance levels (all > 0.10) and condition indices (all < 30) further validate that the explanatory variables provide distinct information, with no severe collinearity issues.

Table 6: Heteroskedasticity test results (Breusch-Pagan-Godfrey)

| Test Statistic | Value | Degrees of Freedom | p-value | Decision (α=0.05) |
|---|---|---|---|---|
| F-statistic | 0.923 | (4, 26) | 0.465 | Fail to reject $H_0$ |
| Obs*R-squared | 3.856 | 4 | 0.426 | Fail to reject $H_0$ |
| Scaled explained SS | 2.356 | 4 | 0.671 | Fail to reject $H_0$ |

**Source:** Author's Computation, 2021

Table 6 presents the Breusch-Pagan-Godfrey test results. The result confirms that the regression model satisfies the classical assumption of homoskedasticity, as all test statistics fail to reject the null hypothesis of constant variance in the error terms. The F-statistic (0.923, p = 0.465), the observed R-squared (3.856, p = 0.426), and the scaled explained sum of squares (2.356, p = 0.671) all yield p-values well above the 0.05 significance threshold, indicating no evidence of heteroskedasticity. This suggests that the variance of the residuals remains stable across all levels of the explanatory variables, ensuring the efficiency and reliability of the ordinary least squares (OLS) estimates.

Discussions of findings

The empirical results strongly support the hypothesis that adopting financial technology significantly reduces poverty rates in Nigeria, consistent with global evidence from Chen and Zhao (2021) in China and Gautam et al. (2021) in India. The negative and statistically significant coefficient for fintech (β = -0.177, p < 0.05) confirms that digital financial services improve financial inclusion, especially for Nigeria's unbanked and underbanked populations. This finding aligns with financial inclusion theory (Demirgüç-Kunt & Klapper, 2012), which suggests that access to affordable financial services enables savings, credit access, and risk mitigation—key mechanisms for reducing poverty.

The magnitude of this effect (a 1.77% reduction in poverty for every 10% increase in fintech penetration) indicates that Nigeria's fintech sector, though still in development, has a stronger impact than in some Asian economies, likely due to the country's historically high rates of financial exclusion. However, the lack of a significant relationship between literacy rates and poverty reduction (β = -0.207, p > 0.10) challenges traditional technological diffusion theory (Rogers, 2003), which considers education a prerequisite for adopting new technology. Instead, Nigeria's high mobile penetration (82%) may enable fintech use even among populations with low literacy, supporting a complex (e.g., investment and insurance platforms).

The positive but insignificant coefficient for GDP growth ($\beta = 0.409$, $p > 0.10$) highlights Nigeria's growth-poverty paradox, where economic expansion has not led to proportional poverty reduction. This supports poverty trap theory (Azariadis & Stachurski, 2005), which points to structural barriers that prevent the poor from benefiting from macroeconomic growth.

The results indicate that fintech could be a more direct tool for alleviating poverty than GDP growth alone, emphasizing the importance of targeted financial inclusion policies. Additionally, the insignificant yet positive relationship between mortality and poverty ($\beta = 0.090$, $p > 0.10$) suggests broader systemic issues—health shocks can drain household savings, but fintech's role in alleviating these impacts (such as through health insurance platforms) remains largely unexplored in this model.

## CONCLUSION AND RECOMMENDATIONS

This study provides strong empirical evidence that adopting financial technology significantly helps reduce poverty in Nigeria, with a 10% increase in fintech penetration linked to a 1.77% decrease in poverty rates from 1993 to 2020. The results support financial inclusion theory while challenging traditional beliefs about literacy requirements for technology adoption, emphasizing Nigeria's unique "digital leapfrogging" path. However, the limited influence of GDP growth and literacy rates highlights the need for targeted policy actions.

The study's findings highlight three key policy priorities for maximizing fintech's role in alleviating poverty in Nigeria, each requiring targeted strategies for implementation. First, expanding digital infrastructure must go beyond general calls for investment to include specific actions such as establishing a Rural Digital Infrastructure Fund, which would offer tax incentives for telecom companies to deploy towers in underserved areas, along with a requirement for operators to allocate 5% of their annual profits to rural network expansion. This directly addresses the infrastructure gap that currently limits fintech access for 40% of the rural poor.

Second, digital literacy programs should be significantly expanded through innovative methods like integrating fintech modules into the National Youth Service Corps curriculum and deploying mobile "Digital Vans" with satellite internet to provide hands-on training in USSD banking and fraud prevention at the village level, specifically addressing the study's finding that current literacy interventions are inadequate.

Third, credit access reforms should be implemented through immediate regulatory changes, including introducing tiered KYC requirements that allow low-balance accounts with simplified biometric verification and creating an Open Credit Registry that leverages alternative data like mobile money transactions to serve as collateral for the unbanked. To ensure coordinated delivery, these interventions should be overseen by a dedicated Fintech-Poverty Task Force under the Ministry of Finance, with state-level budget allocations tied to measurable fintech adoption targets among low-income populations. By grounding these recommendations in the study's empirical findings—particularly the significant poverty reduction coefficient for fintech adoption ($\beta = -0.177$)—while addressing the revealed limitations in literacy and credit access effects, this framework provides an actionable blueprint for translating academic insights into tangible poverty alleviation outcomes. Future policy evaluations should incorporate gender-disaggregated impact assessments to ensure equitable benefits across population segments.

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