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Artificial Intelligence and Poverty Reduction: How AI Applications and Digital Solutions Can Help, particularly in Developing Countries

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Abstract: Artificial Intelligence (AI) is seen as a new remedy to address pressing global challenges of poverty and human wellbeing through technology interventions such as in health, education, agriculture, finance, and governance. While digital connectivity grows, internet diffusion increases, and data availability proliferates, AI offers new tools to eradicate poverty with innovative and scalable solutions. These solutions will take various forms in healthcare service delivery, personalized education and learning, climate-smart agriculture, inclusive financial services, and transparent governance. This chapter discusses the multiple applications of AI to reduce poverty and enhance wellbeing, particularly in developing countries. The chapter offers an analysis of the potential and risks of using AI to promote inclusive and equitable development by drawing from recent literature while discussing the socio-ethical, technical, and policy impediments. The chapter emphasizes that the development and deployment of AI need to be inclusive and human-centered in relation to the SDGs so that technology benefits the human condition. From current literature, we draw upon issues that concern the potential of AI to ensure inclusive development as well as technical and policy considerations to be considered. Key policy recommendations and proposals are presented for governments, development agencies, and other stakeholders for AI-enabled inclusive poverty reduction and well-being.

Keywords: Artificial Intelligence, Developing Countries, Digital Solutions, Inclusive Development, Innovation, Poverty Reduction, Sustainable Development, Wellbeing.

Introduction

Poverty is one of the most persistent global challenges in the 21st century, especially for populations in developing countries where a lack of sufficient access to education, health, infrastructure, and livelihood opportunities prevents them from having sustainable developmental progress. International aid over several decades has not successfully and consistently reduced the problem of poverty, with many countries witnessing a growing socio-economic divide (World Bank, 2020). Concurrently, the rapid emergence of digital technology, particularly Artificial Intelligence (AI), presents the possibility of eliminating multidimensional poverty. AI-driven applications and digital solutions can revolutionise poverty reduction through improving service delivery, decision-making, and providing new avenues for inclusive growth (Brynjolfsson & McAfee, 2017).

In the case of underdeveloped countries, the effective usage of AI could be of paramount importance through the development and implementation of technology in key areas such as agriculture, health care, education, financial inclusion, and social protection systems. For example, AI enabled precise farming can contribute to yield improvement and climate change adaptation of smallholder farmers, while machine learning enables enhanced health care through predicting illness, early diagnosis, and resource allocation. In terms of finances, AI-enabled digital financial services have enhanced accessibility of banking and credit to vulnerable sectors of the population, improving entrepreneurship and eliminating poverty traps and isolation. Governments and development agencies can also utilise AI-enabled data analysis to increase target orientation of poverty reduction initiatives and measure results.

However, the use of AI in poverty reduction raises ethical concerns as well as concerns about digital gaps and data privacy, and an exacerbated effect of inequalities if access to technology varies immensely (Jobin et al., 2019). As such, while AI holds significant potential for poverty reduction, its application in developing countries requires an inclusive, human-centered approach based on equity, capacity enhancement, and participation from below.

Methods

The methodology involved a literature search through web portals, academic archives, and reliable media and publication houses, focusing on Artificial Intelligence applications developed within the last 5 years. The literature search required inclusion of empirical studies, case reports, policy analyses, and pilots of using AI technologies to eradicate poverty and enhance human wellbeing in developing countries. Specific areas of interest included the application of the technology to agriculture, health, education, financial services, and governance sectors and in relation to the SDGs targets.

Linking Artificial Intelligence & Poverty Pathways

Poverty could be addressed through the implementation of AI in three dimensions. The first dimension is through boosting productivity. AI-enabled tools can be used to improve agricultural yields, improve supply chains, and reduce errors, thereby increasing income for the poorer community (Lowder et al., 2021). The second aspect of AI's role in poverty reduction involves improving access to social services.

AI can enhance access to social services, such as financial services, healthcare services, and education services, by bridging the gaps that exist in expertise, cost, and distance (Miao & Holmes, 2021). The third dimension is improved targeting of social interventions. AI can analyse mobile data, cell phone information, and administrative databases, using machine learning to allow governments and non-governmental organisations to accurately pinpoint vulnerable population groups for targeted policy interventions and evaluate their effectiveness in real-time (Jean et al., 2016). However, the effectiveness of these avenues is contingent on local infrastructure, local capacity, trust and ethical standards.

Sectorial Applications

Agriculture

The contribution of agriculture to employment in low-income countries remains significant. AI applications in sustainable agriculture, such as climate-smart farming techniques, pest & disease forecasting and monitoring, and precision farming, have shown positive development (Kamilaris & Prenafeta-Bold, 2018). For instance, an AI programmed to assess satellite imagery could determine yield forecasts and soil health, allowing for the provision of highly specific recommendations to smallholder farmers by extension services. Mobile-based AI-driven tools have helped farmers in Sub-Saharan Africa manage their planting and irrigation needs, thereby lowering the effects of climate change (World Bank, 2019).

Health

A widespread shortage of health experts across the developing world could be addressed through statistical analysis, the application of artificial intelligence and text-mining on health chatbots. For instance, AI technology can detect pneumonia and tuberculosis from chest X-rays, enabling early identification in rural health centres with limited radiologists (Esteva et al., 2017). Predictive models to forecast disease outbreaks could provide critical evidence to governments and international bodies for resource allocation in epidemic scenarios, such as the COVID-19 pandemic (World Health Organization, 2020).

Education

AI-driven personalised learning ensures more inclusiveness, equity, and engagement as the system adapts to individual student learning pace (Luckin et al., 2016). AI tutors can support resource-constrained schools with limited teacher capacity. Bridging communication barriers is also a possibility due to artificial translation technology, enhancing access to learning materials for students speaking minority languages (Miao & Holmes, 2021).

Financial Inclusion

Access to advanced finance for the poor is improved using mobile money transaction records and AI-based credit scoring utilising a blend of traditional and nontraditional information (Saluja, Singh, & Kumar, 2023). Fintech companies in Kenya, for example, utilise AI to issue micro-loans to small businesses (Suri & Jack, 2016). Furthermore, fraud detection systems protect vulnerable sections of the population from fraud.

Social Protection & Governance

The state could be utilising AI to monitor its cash transfer programs by enhancing transparency, beneficiary selection accuracy, and reducing leakages. The mapping of poverty to local communities has been achieved by utilising AI to analyse satellite images to enable better targeting of social protection (Jean et al., 2016). Government services could be more responsive to the needs of citizens by utilising Natural Language Processing (NLP) to assess public feedback (Benoit et al., 2016).

Plan for Inclusive Artificial Intelligence in Poverty Reduction

Partners, together with developing countries, must pursue a holistic approach in several key areas for equitable use of AI; initially, they must prioritise investment in digital infrastructures such as availability and affordability of devices, electricity, and the internet (ITU, 2021), and boost the capacity of individuals, institutions, and policymakers through imparting digital literacy and skills (Miao & Holmes, 2021). Secondly, promote the deployment of inclusive AI by establishing ethical AI governance frameworks to protect data privacy and security and ensure fairness and accountability (Jobin et al., 2019), while promoting local institutions, entrepreneurs, and Civic Tech groups that could foster local innovation ecosystems (Ndemo & Weiss, 2017). Third, use participatory design approaches and engage the affected individuals in co-creation of solutions (Smith & Neupane, 2018). Lastly, share AI-related research knowledge, fund research projects, and standardize its use across borders to promote responsible innovation in developing regions (UNDP, 2022).

Challenges and Risks

Despite its broad potential, the adoption of artificial intelligence in development contexts faces several interrelated challenges. The most salient include ongoing digital infrastructure gaps such as poor connectivity, lack of available hardware, and insufficient data availability within underserved communities (Hilbert, 2016). Complementing these systemic disadvantages, privacy and security risks arise, given the vulnerability of personal and community data lacking appropriate protection from misuse (Floridi et al., 2018).

Several other ethical risks beyond those relating to infrastructure are inherent in the application of artificial intelligence. Key issues include algorithmic bias, invasion of privacy, the spread of misinformation, and the disempowerment of marginalised populations (O'Neil, 2016). Institutional and legislative risks are present, including weak governance frameworks, weak regulatory oversight, and insufficient AI literacy. Dynamics of international assistance are further relevant; AI-driven innovations are prone to foster dependency and exert undue ideological influence while leading to unresolved sustainability questions.

Workforce disintermediation presents another core challenge where automation leads to significant displacement in low-skill employment opportunities, thus requiring workforce reskilling initiatives and well-being social protection systems (Frey & Osborne, 2017). A further challenge relates to limited capacity, which restricts the effective design, implementation, and contextual adaptation of AI products, due to shortages in expertise and material resources. In conclusion, environmental factors need attention where AI applications demand high computational power in contrast with broader sustainability objectives (Strubell et al. 2019).

Results

AI in Healthcare and Wellbeing

In low-resource and developing settings, artificial intelligence is gaining increased applicability in addressing health and wellbeing challenges. Building on field experiences in Ghana and Nepal, a new publication provides a framework for the responsible adoption of AI in low-resource health settings, focusing on key elements such as data privacy, trustworthiness, Reliability, and appropriate contexts for governance (Neupane & Mishra, 2025). In South Africa, artificial intelligence is employed to improve access to rural health services-the nationwide Mom Connect program utilises chatbots and AI-powered messaging for virtual consultations to improve care of pregnant and postpartum women, expanding care coverage and reducing pressure on facilities.

AI in Agriculture and Climate-Resilient Food Security

In developing contexts, artificial intelligence is playing a growing role in enhancing crop yields, climate resilience and rural well-being. The United Nations 'Food and Agriculture Organization (FAO,n.d.) reports that AI-enhanced agricultural platforms, such as Crop in Smart Farming in India, have digitised many millions of acres of land and supported millions of farmers across several countries by using geotagging, remote crop monitoring, and detection of specific crops. This work leverages artificial intelligence, weather intelligence, and high- resolution crop management to boost food security and rural well-being.

Similarly, in South African farms, Aerobatics utilises artificial intelligence alongside drones and satellite imagery to pinpoint infestation with insects and tailor nutrient, crop protection, and irrigation solutions-empirically, drone-

assisted pest management identified by Aerobatics targeted root rot detection has reduced agricultural export losses by an average of 62%, and drone-guided irrigation practices have cut South African orchards' watering costsbyapproximately35% (Dzreke, 2025).

AI in Education

Artificial intelligence has a growing impact on solving persistent problems of access to and quality of education in developing countries. In Malawi, one course software offers learning opportunities targeting literacy and numeracy instruction with underserved and remote communities, which enables children to acquire job-ready skills and self-confidence. Randomised controlled studies conducted in government schools in Malawi demonstrate learning gains lasting for years in both numeracy and literacy amongst children learning using one course (One Billion, n.d.). More broadly, artificial intelligence-assisted educational solutions- adaptive learning, multilingual support tools and teach-assist tools in Particular- have demonstrated the ability to increase and improve education's reach and quality in developing countries by supporting language accessibility, instruction-planning, instruction-development and assessment, as well as individualised tuition methods for learners of varying characteristics (Landa-Blanco, 2026).

AI for Financial Inclusion and Wellbeing

For advancing economies, AI's application is proving crucial in strengthening financial services for marginalised communities. AI- driven microfinance organisations like Tala (Kenya)and Branch (Nigeria) leverage alternative data to conduct real-time creditworthiness assessment among previously excluded populations with no formal credit record, from call detail records and app usage and payment patterns toward transaction history. Tala alone has disbursed more than $2billion to more than 6 million previously unbanked people. Access to financial inclusion enables women to achieve greater privacy, independence and financial control over their accumulated assets-especially those belonging to women-as well as fostering a more egalitarian future in developed economies. Accordingly, digital financial inclusion has been recognised as vital for the empowerment of women (Saluja et al. 2023).

AI in Governance, Targeting and Resource Allocation

In emerging economies, artificial intelligence usage has been rapidly increasing across various public services to increase the efficacy of their social protection systems. The Novissi program (Give Directly/Government of Togo) that provided emergency cash transfers to help the poorest during theCOVID19pandemic utilised a machine learning technique powered by the deployment of data gleaned from satellite images and mobile phone usage to estimate the poorest' priority for transfers. Thus, an innovative method in the distribution of social security aid that achieved 4- 21% improvement in reduction of targeting error rates compared to geographic criteria was developed (Aiken et al.2022). The 'SISBEN', Colombian fifth system iteration, uses artificial intelligence for data analysis of the beneficiary register that aims to reduce discrepancies of the database to improve targeting and integrity of social welfare and that has received major critique concerning data usage privacy, informed consent, and treatment of marginalised peoples (Lopez, 2020).

In the international sphere, an important resolution by the United Nations General Assembly was authored by the United States, co-sponsored by over 120 states, including developing countries. This resolution called for advancing responsible use of and promoting equitable and universal access to artificial intelligence technologies. A major thrust of the resolution is the effort to reduce the digital divide and achieve equitable access to AI-based tools and applications to developing countries in 2024 (United Nations General Assembly, 2024).

Ethical, policy, and governance dimensions

AI has emerged as relevant in several critical Sustainable Development Goal (SDG) arenas, including healthcare, education, agriculture, and climate adaptation in 2024. These applications, nonetheless, carry concerns about algorithmic bias, the spread of misinformation, and the digitally marginalised, as well as calls for more AI regulation and intelligence literacy (Guterres, 2026). The narratives in "AI for good" narratives of "Big Tech" on developing countries are not unusual for past aid rhetoric such as maternal health diagnostics to facilitate health deliveries, weather forecasting with big data to aid farmers, or earthquake-resilient infrastructure for disaster response.

These programmes, if not critically assessed, risk strengthening dependency rather than enabling local empowerment in Africa-a sentiment familiar from previous "tech saviour" initiatives on the African continent (Dosunmu, 2025).

The question then is whether these trends in the adoption of AI as a "force for good in developing countries will contribute positively. Governance researchers suggest otherwise, stating that "a rise in inequality is not impossible

without effective institutions for anti- corruption, effective legislation, sufficient knowledge and digital Infrastructure" (Kbis et al., 2022).

Discussion

Potential of AI for Inclusive Development

AI has extensive opportunities to support inclusive development in several related fields: In healthcare, AI could improve patient outcomes in maternal treatment, personalised medical care delivery, and extend access to diagnostic services to underserved geographies. Agriculture stands to benefit from AI's contributions to precision agriculture, climate change-resilient infrastructure, and crop production efficiency gains. Higher quality and access to education can be extended through AI's personalised learning approach in rural and remote locations.

In finance, AI can enable loan assessment to inform microcredit extensions and make services more inclusive.

Finally, improved service delivery in public services and government through AI can enhance targeting, improve access to public services, and optimise social protection. Taken together, all these use cases overlap with and align with a set of relevant Sustainable Development Goals (SDGs), including those on gender equality, health, education, food security, poverty, and the creation of resilience of key systems. Policy Implications and Recommendations number of policy priorities emerge to harness AI effectively and equitably: AI solutions must be human-centred and context-specific, addressing local language, culture and infrastructure-related issues rather than imposing top-down, one-size-fits-all models; The legal framework and monitoring measures must be strengthened, grounded in ethic and Transparency, while aligning to the SDGs mainstream development frameworks, with a view to support the progressive development of relevant ethical principles; Sustained investments in infrastructure, local capacity, digital capacity-building, and AI-readiness must be supported ensure that innovations do not benefit only well-endowed regions at the cost of vulnerable and deprived segments of population. Finance and aid must be directed toward inclusive platforms and frameworks that empower rather than exploit marginalised populations, with support for local entrepreneurship.

For instance, Indian non-profit organization Karya works with partners including Microsoft and the Gates Foundation to create an ethical digital wages system for those, largely in rural areas, who carry out data annotation and labelling tasks, ensuring they get their fair share of the value produced by their data. Tech Herfrica, a non-profit organisation in Nigeria established in 2023, aims to deepen the Gap and increase financial inclusivity for all women and girls through their project. The programme provides access to e-commerce, digital skills, and financial literacy; it connects women, farmers, and traders with markets domestically, regionally, and internationally, thus reducing poverty and food waste. International action, as urged by UNGA resolutions on safe, secure, and trustworthy artificial intelligence, must facilitate mad-benefit sharing and build AI capacities of developing countries and enable equitable access to its dividends worldwide (United Nations General Assembly, 2024).

Conclusion

Research carried out in recent years has demonstrated AI's remarkable capacity to advance poverty reduction and improve well-being in developing countries, through a multitude of Sustainable Applications in Health, Agriculture, Education, Finance and Governance. However, AI has vast potential to contribute to poverty reduction and inclusive development of societies; but this cannot happen unless there are substantial policies and regulatory frameworks on infrastructure, ethical considerations, and governance to ensure that AI innovations remain beneficial to all and context-specific in their local adoption while promoting equitable advancements and inclusiveness, ensuring that all individuals benefit equitably. AI, coupled with digitally enabled devices, has the potential to revolutionize the way in which multiple dimensions of poverty in develop country are addressed.

These technologies can expand the productive and service scopes, provide additional targeting benefits of various social protection instruments, and boost the effectiveness of interventions. Yet, there remains significant risk for excluded or disadvantaged categories, for the potential of unintended bias and for potential malicious application. Accordingly, for equitable benefits and achievement of the SDGs in general, the benefits of AI must leverage an inclusive framework in all developing countries.

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