# LESOTHO NATIONAL HUMAN DEVELOPMENT REPORT 2024

## Harnessing Technology and Innovations to accelerate Human Development in Lesotho.

# LESOTHO NATIONAL HUMAN DEVELOPMENT REPORT 2024

***HARNESSING TECHNOLOGY AND INNOVATIONS TO ACCELERATE HUMAN DEVELOPMENT IN LESOTHO***

---

**General disclaimers**

The findings, analysis, and recommendations of this Report, as with previous Reports, do not represent the official position of the UNDP or of any of the UN Member States that are part of its Executive Board. They are also not necessarily endorsed by those mentioned in the acknowledgements or those cited.

The responsibility for the interpretation and use of the material lies with the reader. In no event shall UNDP or the Ministry of Finance and Planning in Lesotho be liable for damages arising from its use.

## REPORT TEAM

### Supervision

| | |
|---|---|
| Dr. Jacqueline Olweya | UNDP Resident Representative |

### Research Coordinator

| | |
|---|---|
| Dr. Souleman Boukar | UNDP Senior Economic Advisor |

### Lead Team

| | |
|---|---|
| Dr. Leseko Makhetha | National University of Lesotho (NUL) |
| Mr. Ricardo Fuentes-Nieva | International Consultant |

### Team of Researchers

| | |
|---|---|
| Dr.Denis Nfor Yuni | National University of Lesotho (NUL) - Climate Action |
| Dr. Leseko Makhetha | NUL — Climate Action |
| Dr. Alouis Chilunjika | NUL – E-Governance |
| Dr. Thabiso Nyabanyaba | NUL – Education |
| Prof. Tsepo Mokuku | NUL – Education |
| Dr. Relebohile Morojele | NUL – Gender Equality |
| Dr. Josphine Hapazari | NUL – Gender Equality |
| Ms. Makhau Pelea | NUL – Gender Equality |
| Dr. Langton M. Mundau | NUL – Gender Equality |
| Mr. Abiel Mothibakhoro Lekulo | NUL– Health |
| Ms. Mapitso Lebuso | NUL – Health |
| Mr David Fuentes Ricardo | NUL – National Development |
| Dr. Makhala Khoeli | NUL – Statistics |
| Mr. Mpheteli Malunga | NUL – Statistics |
| Ms. Motena Mapesela | NUL – Statistics |

### Advisory Group

| | |
|---|---|
| Malefu Khanyapa | Director, M&E Department, MFDP |
| Matsatsinyana Mating | M&E Department, MFDP |
| Mamotšeoa Makhetha | M&E Department, MFDP |
| Thabiso Kompi | M&E Department, MFDP |
| Malineo Seboholi | M&E Department, MFDP |
| Nomakheswa Mjanyelwa | M&E Department, MFDP |
| Mabulara Tsuene | Programme specialist, UNDP |
| Neo Matsoso | Programme specialist, UNDP |
| Motulu Molapo | SDG specialist, UNDP |
| Refuoe Kajane | Communication and partnerships associate, UNDP |

## FOREWORD

The Government of Lesotho is honoured to present the fourth Lesotho 2023/2024 National Human Development Report (NHDR) with the theme "Harnessing technology and innovation to accelerate human development in Lesotho" which reflects the collective efforts to assess, understand, and enhance the human development landscape of the nation. It stands as a testament for commitment in fostering inclusive growth, reducing inequalities, and ensuring sustainable development for all Basotho.

The NHDR offers an in-depth analysis of the current state of human development in Lesotho, highlighting critical areas such as health, education and income. It provides valuable insights into the progress made, the challenges faced and the opportunities that lie ahead. The findings and recommendations presented in this report are crucial for informing policy decisions and guiding development strategies. On the other hand, the journey towards achieving the Sustainable Development Goals (SDGs) requires a concerted effort from all stakeholders, including the government, private sector, civil society and development partners. The NHDR therefore, serves as a vital tool in this collaborative endeavour, providing a robust framework for tracking progress and identifying key areas for interventions.

As we move forward, it is imperative to remain focused on our shared vision of a prosperous and equitable Lesotho. Let the insights from this report drive meaningful change, empower citizens, and create a brighter future for generations to come. All stakeholders are encouraged to engage with the findings of the NHDR and to use this knowledge to shape policies and initiatives that will propel our nation towards sustainable human development.

Together, a resilient and thriving Lesotho is possible where every individual has the opportunity to reach their full potential.

---

**Retšelisitsoe A. Matlanyane (Dr.)**
**Honourable Minister**
**Ministry of Finance and Development Planning**
**August 2024**

## PREFACE

Lesotho's Human Development Report 2024, titled "Harnessing Technology and Innovations to Accelerate Human Development in Lesotho," is the fourth in a series of such reports undertaken in the country since 1998. This report is timely in its focus on the transformative potential of technology and innovation in advancing human development and enhancing the quality of life for all Basotho.

This comprehensive analysis delves into the multifaceted dimensions of human development, encompassing economic growth, education, health, climate action, and gender equality. The report underscores the transformative power of technology and innovation as pivotal drivers for advancing human development. It highlights the need for strategic investments in digital infrastructure and the establishment of robust e-governance systems to create a resilient digital state. By leveraging technology, we can address the complex challenges that hinder our development, such as poverty, inequality, and limited access to essential services.

One of the critical insights from this report is the importance of inclusive growth. It calls attention to the digital divide that exists between urban and rural areas, emphasizing the necessity of bridging this gap to ensure equitable access to technological advancements. Inclusive growth must prioritize marginalized communities, including women, youth, and people with disabilities, ensuring that they have equal opportunities to benefit from technological progress.

The report also highlights the role of education in fostering human development. It advocates for explicit funding mechanisms and policies that support Science, Technology, Engineering, and Mathematics (STEM) programs. By promoting STEM education, we can cultivate a skilled workforce capable of driving innovation and sustaining a knowledge-based economy. Furthermore, the report stresses the need for educational reforms that cater to the needs of all learners, particularly those in underserved communities.

Gender equality remains a central theme in this report. The report provides a detailed analysis of gender disparities and offers strategic recommendations for promoting the inclusion of women in all spheres of development. It aligns with global commitments, such as the United Nations Sustainable Development Goals (SDGs) and the United Nations Security Council Resolutions on Women, Peace, and Security, to ensure that gender equality is mainstreamed across all development initiatives.

Health is another critical area addressed in this report. The report examines the impact of health on human development and highlights the need for a robust healthcare system that is accessible to all. It calls for comprehensive health policies that address both physical and mental health, recognizing that a healthy population is fundamental to achieving sustainable development.

We extend our deepest gratitude to all contributors and stakeholders who have dedicated their time and expertise to the preparation of this report. Their commitment to advancing human development in Lesotho is evident in the thorough and insightful analysis presented in this NHDR. We are confident that this report will serve as a valuable resource in guiding our efforts towards a more equitable and prosperous future for all Basotho.

Crucial to the success of this endeavour is the collaboration with the Ministry of Finance and Development Planning, the Ministry of Information, Communications, Science, Technology and Innovation, and the National University of Lesotho, whose expertise and dedication have been

indispensable in shaping the NHDR. Together, we aspired to produce a report that not only informs but inspires action, propelling Lesotho towards a future of boundless opportunity and prosperity. As we embark on this journey of discovery and transformation, let us reaffirm our commitment to the principles of equity, inclusivity, and sustainability.

This report is not just a document; it is a call to action. I hope that it will not only inspire decision-makers but also the business community, researchers, and most importantly, Basotho's citizens into more concerted action towards the bright future that Lesotho deserves.

---

**Jacqueline Olweya (Dr.)**
**Resident Representative**
**United Nations Development Programme (UNDP)**
**August 2024**

## LIST OF ACRONYMS

| | |
|---|---|
| AI | Artificial Intelligence |
| ART | Antiretroviral Treatment |
| CoP | Community of Practice |
| COVID-19 | Corona Virus Disease |
| FPE | Free Primary Education |
| GDI | Gender Development Index |
| GER | Gross Enrolment Rates |
| GII | Gender Inequality Index |
| GNI | Gross National Income |
| GNP | Gross National Product |
| GPI | Gender Parity Index |
| HALE | Healthy Average Life Expectancy |
| HDI | Human Development Index |
| HDR | Human Development Report |
| HEMIS | Higher Education Management Information System |
| HIV/AIDS | Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome |
| ICT | Information and Communications Technology |
| IHDI | Inequality-adjusted Human Development Index |
| IKS | Indigenous Knowledge System |
| ILI | Influenza-Like Illness |
| LCA | Lesotho Communications Authority |
| LDC | Least Developed Countries |
| LESPEC | Lesotho Science Pre-Entry Course |
| MCC | Millennium Challenge Corporation |
| MMR | Maternal Mortality Ratio |
| MPI | Multidimensional Poverty Index |
| MSM | Men who have Sex with Men |
| NCDs | Non-Communicable Diseases |
| NEPI | Lesotho Nursing Education Partnership Initiative |
| NHDR | National Human Development Report |
| NUL | National University of Lesotho |
| ODL | Open and Distance Learning |
| PPP | Purchasing Power Parity |
| SACMEQ | Southern and Eastern Africa Consortium for Monitoring Educational Quality |
| SADC | Southern African Development Community |
| SSA | Sub-Saharan Africa |
| STEAM | Science, Technology, Engineering, Arts and Mathematics |
| STI | Science, Technology and Innovation |
| TB | Tuberculosis |
| UNDP | United Nations Development Programme |
| UNESCO | United Nations Educational, Scientific and Cultural Organisation |
| UNICEF | The United Nations Children's Fund |
| USA | United States of America |
| WHO | World Health Organisation |

## EXECUTIVE SUMMARY AND KEY MESSAGES

### Overall structure of the report

The Lesotho National Human Development Report (NHDR) 2024 is organized into three chapters that explore various aspects of human development and the interconnection with technology and innovation. The report begins with the analysis of long term- trends in human development from 1990 to 2023, in particular the Human Development Index (HDI) and individual metrics on health, education, and income levels, along with challenges related to inequality, gender disparities and multi-dimensional poverty. It then explores the current state and future opportunities of technology and innovation in Lesotho, focusing on e-governance, infrastructure, and legislative frameworks, as well as the role of technology in improving service delivery and addressing socio-economic challenges. Finally, the report details the components needed to create an innovation system, gender-inclusive policies, and technology integration to address climate challenges. Each chapter provides conclusions with recommendations for policy makers and is summarized in detail in a section below. Finally, the Appendices provide detailed methodologies and additional data, including HDI calculation, deprivation assessment, and the historical context of academic institutions in Lesotho.

### Purpose of the Report

The purpose of the Lesotho National Human Development Report (NHDR) 2024 is to explore the transformative role of technology and innovation in advancing human development within the country. The report aims to highlight the achievements and challenges in critical areas such as health, education, and income while addressing inequality and poverty. In addition, the report seeks to identify opportunities for leveraging these advancements to enhance service delivery, socio-economic development, and climate resilience by examining the current and future landscape of technology and innovation in the country and with examples from other contexts. Ultimately, the NHDR 2024 aims to inform policy-makers, stakeholders, and the broader community by offering evidence-based recommendations to drive sustainable development and improve the quality of life for all Basotho.

### Report Summary by Chapters

#### *Chapter 1: Human Development Foundations and Trends in Lesotho (1990-2023)*

The first chapter of the NHDR 2024 focuses on the current levels and historical trends of human development in Lesotho from 1990 to 2023. The Human Development Index (HDI) serves as the primary measure, incorporating health (life expectancy), education (mean and expected years of schooling), and standard of living (GNI per capita). As of 2022, Lesotho's HDI stands at 0.521, ranking it 168th out of 193 countries. This value places it in the low human development category, below the average indices of Sub-Saharan Africa (SSA) and least-developed countries. Lesotho's low life expectancy of 53 years and a GNI per capita of $2709 highlight significant developmental challenges exacerbated by HIV/AIDS and the COVID-19 pandemic.

From 1990 to 2022, Lesotho's HDI evolution has been marked by fluctuations due to health crises and economic challenges. Despite some progress in education, where mean and expected years of schooling have shown improvement, the overall life expectancy and income levels still need to catch up. Critical interventions, such as the introduction of free primary health care in 2008 and

the "Test and Treat" policy for HIV/AIDS in 2016, have contributed to gradual improvements in health indicators since 2007.

The HDI tool has been crucial in assessing global progress toward sustainable development goals. The Lesotho Technology HDI expands the standard HDI by adding information and communications technology (ICT) as a fourth dimension, aligning with the theme of Lesotho's 4th National Human Development Report. This integration aims to provide a more comprehensive measure of human development, emphasizing the role of ICT in enhancing long, healthy, and innovative lives, as well as improved access to resources and collaborative learning. However, despite improvements, the 2023 Lesotho HDI shows a slight decline when incorporating the ICT index, highlighting areas needing policy intervention to boost internet access and computer ownership.

Despite historical challenges, Lesotho's HDI trajectory has shown significant progress over recent years. This progress is linked to improved ICT infrastructure and increased mobile phone usage. However, challenges persist, particularly in addressing economic inequality and gender disparities. The gender gap in HDI values and labour force participation underscores the need for targeted policies to promote equal opportunities and holistic human development. Furthermore, while Lesotho fares better than some regions in multidimensional poverty, continued efforts are essential to enhance living standards, health, and education across the population.

***Chapter 2: Current and Future Status of Technology and Innovation in Lesotho***

Chapter 2 of the Lesotho NHDR 2024 focuses on the transformative role of technology and innovation in advancing human development in Lesotho. It highlights the significant progress made in e-governance, which has enhanced accountability and transparency in governance. However, substantial challenges remain, particularly regarding inadequate digital infrastructure and legislative frameworks. The chapter underscores the need for significant investments in broadband connectivity and ICT facilities, especially in rural areas, to build a resilient digital state. Robust institutional and legislative frameworks are essential to support digital transformation, protect data privacy, and ensure cybersecurity.

The chapter also emphasizes the critical role of technology in reducing poverty, inequality, and gender disparities. Digital technologies, if correctly leveraged, can provide equitable access to essential services such as healthcare and education, thus improving the overall quality of life and promoting inclusive development. Despite these potential benefits, adopting new technologies faces challenges, including infrastructure deficits, digital literacy gaps, and financial constraints. Addressing these issues requires coordinated efforts from the government, private sector, and international partners, with strategic investments and policy interventions to harness technology's potential for sustainable development.

The chapter identifies technology as a pivotal driver of economic growth and human development in Lesotho in the near future. It also highlights the importance of expanding internet accessibility, fostering digital entrepreneurship, and integrating ICT in education and healthcare systems and addresses the gender gap in technology access and the need for gender-responsive policies to empower women and girls with digital skills. Additionally, the chapter makes the case for integrating digital innovations in healthcare that can significantly improve health outcomes. The chapter concludes with key recommendations, including strengthening digital infrastructure, promoting STEM education, implementing gender-responsive policies, and using technology to address climate challenges and build sustainable communities.

### *Chapter 3: Promoting an Enabling Environment for Technology and Innovations in Lesotho*

The final chapter of the NHDR 2024 emphasizes the importance of creating a conducive environment for technology and innovation in Lesotho to drive economic growth and human development. Lesotho has the potential to become a technology powerhouse by leveraging its relatively unburdened technological landscape and then adopting the latest information and communication tools swiftly. The chapter outlines the need for substantial investments, long-term planning, and a people-centered approach to technological change. It suggests that transitioning from an agriculture-based economy to a knowledge-based one requires comprehensive partnerships between the government, international agencies, and the private sector, with significant investments in education, healthcare, and infrastructure.

A central theme of the chapter is the role of government in driving innovation. The government and its partners must adopt a visionary approach, identify strategic sectors, take calculated risks, and promote research and development. Investment in universities and research institutions, along with transparency and accountability in governance, is crucial for fostering an innovative ecosystem. Attracting foreign direct investment (FDI) and leveraging Official Development Assistance (ODA) are also highlighted as essential for this transition. Initial investments should focus on healthcare, STEM-focused education, ICT infrastructure, and road networks to address immediate developmental needs and create a foundation for future market development.

The chapter also addresses the need for gender-inclusive technology policies, emphasizing the importance of equitable access to technological and educational opportunities for women and marginalized groups. These efforts include implementing gender-responsive policies and ensuring women and girls have access to STEM education and digital skills. Additionally, the chapter discusses the integration of technology in combating climate challenges, promoting sustainable development, and enhancing resilience through technological innovations. Policy recommendations include developing a legal and regulatory framework that encourages innovation, protects intellectual property, and facilitates business growth. These efforts aim to create a dynamic and inclusive environment where technology can drive sustainable development and improve human welfare in Lesotho.

**Five Key Messages in the Report**

**Key message 1: Invest in Digital Infrastructure:**

Significant investments in broadband and ICT facilities, especially in rural areas, are essential for building a resilient digital state and bridging the digital divide for inclusive socio-economic development.

**Key message 2: Foster an Enabling Environment for Innovation:**

Create a conducive environment for innovation through long-term planning, substantial investments, and strategic partnerships, focusing on research, STEM education, and robust institutional frameworks.

**Key message 3: Integrate ICT in Human Development Metrics:**

Enhance human development measures by incorporating ICT as a fourth dimension in the HDI, emphasizing technology's role in improving health, education, and living standards.

**Key message 4: Promote Gender-Inclusive Technology Policies:**

Implement gender-responsive policies to empower women and girls with digital skills and ensure equitable access to technological and educational opportunities, promoting inclusive human development.

**Key message 5: Leverage Technology for Climate Resilience:**

Integrate digital innovations to address climate challenges and promote sustainable development, enhancing environmental resilience and overall quality of life in Lesotho.

# Table of Contents

## List of Tables

## List of Figures

## List of Figures cont…

## List of Boxes

# INTRODUCTION

## Concept and Measurement of Human Development

The Human Development Report is a flagship publication of the United Nations Development Programme (UNDP) whose aim is to foster human development globally by creating an enabling environment for people to enjoy a healthy and long life, acquire knowledge and have access to the resources needed for a decent standard of living. If these essential choices are not available, many other opportunities remain inaccessible. But human development does not end there. Additional choices, highly valued by many people, range from political, economic and social freedom to opportunities for being creative and productive and enjoying self-respect and guaranteed human rights. Human development has two sides: (1) the formation of human capabilities such as improved health, knowledge and skills and (2) the use of their acquired capabilities for productive purposes, leisure or for being active in cultural and political affairs[1].

The global Human Development Reports have been released since 1990 and explored various development themes through the human development lens to shape the global development agenda. This process has been adopted at the regional and country-level, to produce reports that address development challenges and analyses at regional and national levels. Reports combine qualitative and quantitative information and analyses to inform policy choice and design, monitor trends during implementation, and evaluate policy and forecast trends for the future.

The human development approach has also promoted the emergence of various metrics for measuring progress in development that integrate human capabilities and well-being. These are statistics and data-dependent indices, used to compare achievements in different dimensions of human development. The original Human Development Index captures three dimensions: a long and healthy life (measured as life expectancy at birth), access to knowledge (measured as means years of education and expected years of education), and a decent standard of living (measured as gross national income per capita). Other indices introduced through the approach include the Inequality-adjusted Human Development Index, the Gender Inequality Index, the Gender Development Index, and the Multidimensional Poverty Index.

[1] Nayak P, 2008

## Review of Lesotho's National Human Development Reports and the Role They Played

Lesotho has developed three national human development reports since 1998. Recommendations and lessons from these reports have been used to shape economic debates and policy responses towards human development in the country. The first National Human Development Report (NHDR) was launched in 1998. The report, themed "Hunan Development" was aimed at introducing the human development approach in Lesotho, to spur debates and policy focus for a human-centred development agenda, and providing lessons on how the agenda may be adopted to generate evidence for policy-making and development. Since this report, the human development index indicators have been used to describe outcomes and inform policy decisions in health and education.

The second report, published in 2006, was themed "The Challenges of HIV/AIDS, Poverty and Food Insecurity". HIV/AIDS presented an emerging development challenge, compounding the effects of poverty, inequality and food security within Lesotho's population, and posed major risks for the country's journey to achieving Millennium Development Goals (MDGs). The report provided an analytical basis for policy prioritisation, highlighting the socio-economic and structural drivers for HIV/AIDS infection and poverty in the country, which included high unemployment rates, lack of skills, migration low agricultural productivity, and lack of access to basic services. The report produced a human development scorecard to analyse the poverty and human development trends in Lesotho and the attainment of MDGs. The scorecard confirmed that poverty incidence among low-income and rural households was high, particularly affecting women-headed and elderly-headed households. The households also had lower educational attainment, the least economic assets and did not have access to basic services, including safe drinking water and sanitation. The report made recommendations for accelerating and scaling the response to HIV/AIDS, building partnerships to implement the MDGs, and strengthening the Monitoring and Evaluation (M&E) tools and data systems for reporting. The report concluded that HIV/AIDS was the most critical threat to Lesotho's human development at the time and its ability to reach the MDGs.

The third report, published in 2016, 'Leveraging the Power of Youth for Human Development" explored the status of youth and their role in achieving sustainable development in Lesotho. The report reflected on youth in areas of education, health, social development, and employment. The report concluded that relative to Lesotho's demographic bulge, more efforts were necessary to achieve youth-inclusive development that would recognise the power inherent in the youth for innovations, job creation and stability.

## The Relevance of an NHDR on Technology and Innovations in Lesotho

The selected theme of the 4th Lesotho NHDR is "Harnessing Technology and Innovations to Accelerate Human Development in Lesotho". The report will explore the role of technology and its potential to achieve human development in Lesotho, using the capabilities approach, interrogate trends, experiences and lessons using the capabilities approach, and review policy positions and gaps to determine the potential and realised impact of technology and innovations on human development. The report will provide policy recommendations for expansion and integration in key economic sectors, infrastructure development and investment to enable technological exploitation for achieving the Sustainable Development Goals (SDG and human development in the country. This report will not only serve as policy guidance but will also explore the opportunities and benefits of the 4th Industrial Revolution for the country and for realising the National Strategic Development Plan II (NSDP II) objectives and SDGs targets.

Technology is selected as one of the four economic growth drivers in the NSDP II due to its potential to create employment and improve economic competitiveness. Through the NSDP II, the Government of Lesotho anticipate that "transforming potential technology and innovation in production systems will improve efficiency, effectiveness, and precision of production necessary to achieve inclusive economic growth and job creation". Evidence from other countries suggests technology is intimately linked to economic growth, industrial development, and capabilities. In developed countries, the adoption of technology and technology-based innovations has scaled health and care services, education, and skills development, opened opportunities for higher earnings and quality of work, and improved social outcomes.

At the height of the COVID-19 pandemic, technology provided solutions when human capability was limited, and health risks were major. At the same time, automation has also resulted in loss of human development. jobs and increased inequalities2; putting at risk some gains already attained in human development. According to HDR 2021, the technological transformation will shape the future outcomes of human development, potentially exacerbating the existing inequalities between societies and people. However, technology also has the potential to improve human development while the risks exist and therefore choice and use of technologies should be selective. The purpose of this report will therefore be to assess the social challenges that may be brought about by

[2] IMF, 2021

technology, with critical analysis of its contribution to human development capabilities, way of life and access to resources that enhance the quality of life.

Development trends in Lesotho indicate that progress in information, communications, and technology (ICT) has had a significant impact on the status of education, health, income and dimensions of participation and empowerment, thus improving the human quality of life and capabilities. ICT accounts for 5% of the GDP in Lesotho, making it one of the best-performing and dynamic sectors. The adoption of digital technology within telecommunication and financial services has significantly changed the face of poverty and bridged the gaps in access to finance and social services. Although internet connectivity and use are low, 90% of the country has mobile technology coverage, facilitating broad access to mobile technology and voice connectivity, and usage has increased significantly between 2020 and 2021.

It has been noted that ICT can promote gender empowerment or prevent it. Globally, a smaller percentage of women own mobile phones than men and there is a gender gap in access to the internet and technology. There are clear benefits to ensuring women and girls have access to ICT adoption, technology, and innovation capabilities. Empowering girls and women to use technology will contribute to increased economic productivity and competitiveness, stronger earning potential for women, and more diverse technology and digital content that better reflects the needs and priorities of a wider audience[3].

Lesotho has a high unemployment rate, largely affecting youth at more than 30% unemployed or underemployed. Following the Lesotho Human Development Report 2016, this report is expected to harness the demographic opportunities associated with Lesotho's young population, to accelerate technological adoption for creating employment opportunities and promoting innovations. The report is expected to explore means to leverage technology for improved efficiencies, effectiveness economic impact and job creation, as well as provide options for mitigating job losses associated with the adoption of technology.

## The process

In preparation for this report, six background papers were commissioned to the extent to which capabilities of technology and innovation may catalyse human development. The background papers focused on human capital development, economic transformation, standards of living,

[3]How Technology is Helping Close Gender Gap and Empower Women (singularityhub.com)

governance, gender equality, women's empowerment, and climate action and resilience building. The sub-themes for the background papers were:

1. Gender equality: Harnessing the power of technology and innovation to drive gender equality and women's inclusion (human development).
2. Education: Rethinking the role of academic institutions in building knowledge economies and skills for the 21st century.
3. Economic transformation: Leveraging technology and innovation to advance inclusive economic growth and structural transformation.
4. E-Governance: Employing technology and innovations for public service delivery, effectiveness, and efficiency.
5. Climate action: Building sustainable and resilient communities for climate action through technology and innovations.
6. Health: Technology and innovation towards convergence in health and social justice.

The Lesotho NHDR process was participatory and inclusive of key national stakeholders and population groups, considerate of Lesotho's economic, social and geographic landscape. Consultations were conducted with interest groups that included civil society, academia, government ministries, youth groups and international organisations. UNDP and the Ministry of Finance and Development Planning mobilised national leadership and ownership of the report by hosting a wide range of consultations with national stakeholders on the theme of the report by hosting wide consultations with national stakeholders on the theme of the report, identifying national policy areas, strategies, and policies relevant to the theme and refining the concept note for implementation. Furthermore, UNDP also facilitated national workshops to build national capacities for human development approaches and analytical framework to prepare for the national team of writers and facilitate statistical analyses.

Lastly, the national team of writers in collaboration with UNDP facilitated national workshops for validation sessions whereby all the background papers were presented to stir debates and critical thinking based on human development approaches consistent with the sub-themes. During the knowledge-sharing sessions, the research findings, recommendations and policy brief were discussed with key stakeholders. Furthermore, to meet the participatory nature of our approach, the validation sessions will be spread across the two phases of the project.

# CHAPTER 1

## HUMAN DEVELOPMENT FOUNDATIONS AND TRENDS IN LESOTHO (1990-2022)

## 1.1 The Complex Challenges of Human Development in Lesotho

The Human Development Index (HDI) is a composite statistical measure developed to assess and compare the level of human development across countries. It considers three key dimensions: health measured by life expectancy at birth, education measured by mean and expected years of schooling and standard of living measured by GNI per capita. In 2022, the Lesotho HDI stood at 0.521 and the country appeared in position 168 in human development out of 193 countries and territories. In the category of low human development countries (HDI below 0.550), Lesotho appeared in position 8 out of 33 countries. The Lesotho HDI is below both the average index (0.549) of the Sub-Saharan African (SSA) countries and the average index (0.542) of least-developed countries. In the Southern African Development Community (SADC) region, Lesotho appears in position 12 whereas Seychelles, which is the only SADC country that falls in the category of high human development (HDI from 0.800), ranked position 1 in the SADC region (Table 1.1) and 67 worldwide.

Lesotho lagged behind on life expectancy and income. The Lesotho life expectancy of 53.0 years is the lowest in the SADC region and ranks 32 out of 33 countries in the low human development category. Similarly, the Lesotho life expectancy is below the average life expectancy of both the SSA and low human-developed countries of 60.6 years and 61.6 years respectively. The low life expectancy in Lesotho could be attributed mainly to deaths due to HIV/AIDS and/or opportunistic diseases, and COVID-19 pandemic respectively. Lesotho's level of income at the international level, measured by GNI per capita in Purchasing Power Parity (PPP) terms stood at US$2709 as of 2022, which is below the SSA's average income of US$3666 and US$3186 for the low-level human developed countries.

**Table 1.1: Lesotho's HDI Relative to SADC Member Countries in 2022**

| HDI Rank | SADC Region HDI Rank | Country | HDI | Life Expectancy Index | Education Index | GNI Index |
|---|---|---|---|---|---|---|
| 67 | 1 | Seychelles | 0.802 | 0.738 | 0.729 | 0.839 |
| 72 | 2 | Mauritius | 0.796 | 0.823 | 0.788 | 0.815 |
| 110 | 3 | South Africa | 0.717 | 0.651 | 0.763 | 0.735 |
| 114 | 4 | Botswana | 0.708 | 0.632 | 0.685 | 0.768 |
| 142 | 5 | Namibia | 0.610 | 0.605 | 0.571 | 0.673 |
| 142 | 5 | Eswatini | 0.610 | 0.571 | 0.567 | 0.656 |
| 150 | 7 | Angola | 0.591 | 0.640 | 0.519 | 0.604 |
| 152 | 8 | Comoros | 0.586 | 0.668 | 0.501 | 0.521 |
| 153 | 9 | Zambia | 0.569 | 0.634 | 0.543 | 0.524 |
| 159 | 10 | Zimbabwe | 0.550 | 0.605 | 0.626 | 0.550 |
| 167 | 11 | Tanzania | 0.532 | 0.711 | 0.469 | 0.496 |
| **168** | **12** | **Lesotho** | **0.521** | **0.509** | **0.533** | **0.498** |
| 172 | 13 | Malawi | 0.508 | 0.660 | 0.203 | 0.403 |
| 177 | 14 | Madagascar | 0.487 | 0.685 | 0.451 | 0.407 |
| 180 | 15 | Democratic Republic of Congo | 0.481 | 0.669 | 0.548 | 0.508 |
| 183 | 16 | Mozambique | 0.461 | 0.605 | 0.390 | 0.375 |

*Source: Human Development Report, 2023/2024.*

## Lesotho's HDI and Components Evolution (1990-2022)

Figure 1.1 shows the movement in HDI and indicators from 1990 to 2022. The figure shows that during the early 1990s, the HDI experienced slight fluctuations within a narrow range between 0.479 in 1990 and 0.456 in 1999. The figure further shows that in the early 2000s, Lesotho witnessed a slight decline in HDI, reaching its lowest point of 0.444 in 2006. During the same period, the country experienced a considerable decline in life expectancy from 59.4 years in 1990 to 42.9 years in 2006, which translates to a 27.78% decrease over this period and an average annual decline of 1.74%, and this could be one of the reasons for the decline in the country's HDI. The country's life expectancy was adversely affected by the human immunodeficiency virus and

acquired immunodeficiency syndrome (HIV-AIDS) pandemic which led to high mortality rates during this period.

The results further indicate that from 2007 onwards, Lesotho experienced a gradual recovery and growth in HDI. The HDI steadily increased from 0.450 in 2007 to 0.530 in 2020 indicating improvement in human development. This is essentially due to an improvement in life expectancy from 42.9 years in 2006 to 54.7 years in 2020. This improvement in both HDI and the life expectancy at birth could have been driven by the introduction of no user fee in 2008 for primary health and much lower user fees for other levels of care. The country might have also benefitted from the United States (US) Millennium Challenge Corporation funding to rebuild all primary healthcare centres throughout the country to improve health services accessibility for many Basotho, including those that are in the rural areas.

Both the HDI and life expectancy improved further because in 2016 Lesotho was the first country in Sub-Saharan Africa to adopt the World Health Organisation's new slogan "Test and Treat" against HIV/AIDS, making it easier for people testing positive for HIV, to immediately be enrolled on treatment regardless of their immunity level (Omer and Francisca 2021). Furthermore, in 2000, the Government in collaboration with multi-sectoral stakeholders developed a National policy on HIV/AIDS Prevention, Control and Management to create a conducive environment for the prevention of the further spread of HIV and AIDS and to mitigate the adverse impact on the infected individuals, families and communities. However, the momentum slowed down in the last two years, with a slight decline in HDI from 0.530 in 2020 to 0.522 in 2021 and 0.521 in 2022. The country also experienced a decline in life expectancy at birth from 54.7 years in 2020 to 53.1 years in 2021 and 53.0 in 2022, and this may be due to deaths caused by the COVID-19 pandemic. These results point to the need for continued attention to healthcare and socioeconomic factors that affect people's development.

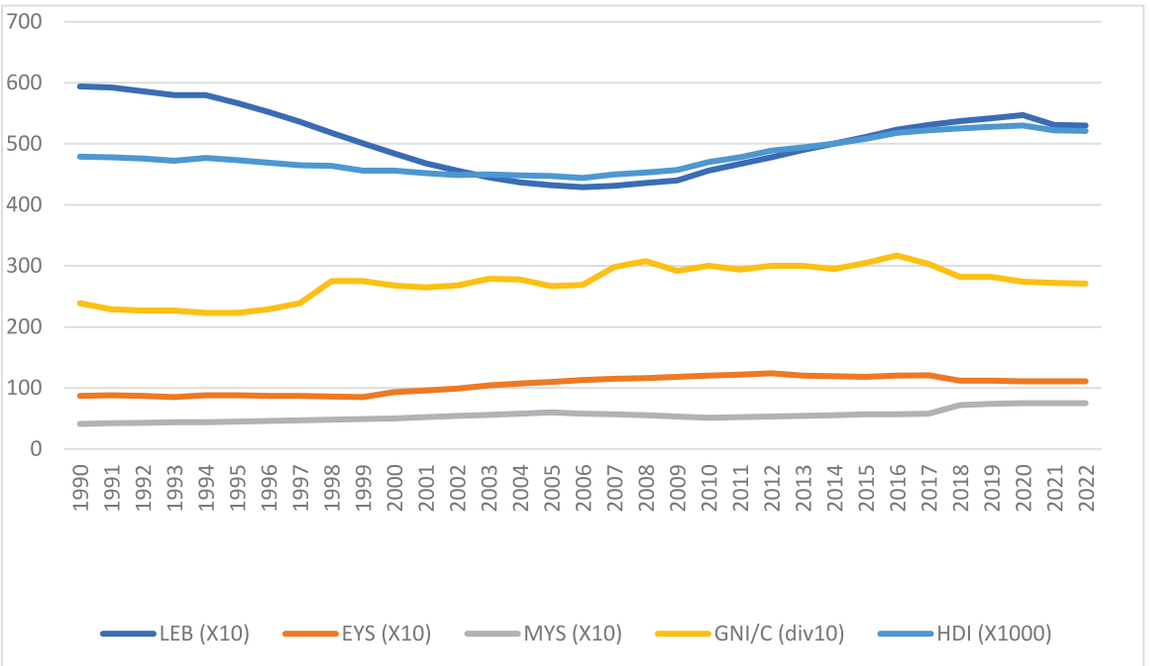



**Figure 1.1: Lesotho's HDI and Components Evolution (1990-2022)**
*Source: Human Development Report, 2023/2024.*

Lastly, Figure 1.1 presents the movement in the education dimension of human development from 1990 to 2022. Education plays an important role in fostering human development, and mean years of schooling together with expected years of schooling are crucial indicators reflecting the educational landscape of a nation. The analysis of these indicators from 1990 to 2022 provides valuable insight into the progress that Lesotho has made concerning education. Mean years of schooling exhibited a steady increase from 4.1 years in 1990 to 6 years in 2005, representing a 46.34% increase over 15 years that translated to the average annual increase of 3.09%. However, Lesotho experienced a decline in mean years of schooling from 6 years in 2005 to 5.1 years in 2010, reflecting a 17.65% decrease that translates to a decrease of 3.53 per annum. From 2010 to 2020, mean years of schooling continued to progress gradually reaching 7.5 years in 2020. The percentage increase from 2010 to 2020 was 47.05% resulting in an average increase of 4.70% annually.

The expected years of schooling have remained in the range of 8.5 to 8.7 years for ten years, from 1990 to 1999 (Figure 1.1). This was followed by a significant increase of 46.43% to its peak of 12.4 years in 2012 and an average annual increase of 3.57%. This improvement in the expected years of schooling occurred after the adoption of the Millennium Development Goals (MDGs) in 2000 where one of the priorities was for the country to further improve access to education at all levels. However, this indicator started to drop slightly to 12.0 years in 2013 and remained in the range of 11.8 to 12.1 years for the rest of the years until 2022. These movements reveal that Lesotho has made significant strides in improving education indicators with both mean and expected years of

schooling showing progress. Continued focus on educational policies, resource allocation, equitable access and other relevant factors is essential for sustaining and furthering these positive contributions to comprehensive human development in Lesotho.

The downward trend in the incidence HIV incidence and prevalence is also another factor that contributed to the improvement in life expectancy from 42.9 years in 2006 to 54.7 years in 2020. The prevalence of HIV infection among persons aged 15–49 years was 24.6% in 2014 (Schwitters et al. 2022). The incidence of new infections is 1.9 per 100 person-years of exposure, and low antiretroviral treatment (ART) coverage has been reported (Schwitters et al. 2022). The HIV adult prevalence rate is 20.9% (Schwitters et al. 2022; World Bank 2023). Nonetheless, HIV prevalence in Lesotho has been declining since 2015 as shown in Figure 1.2

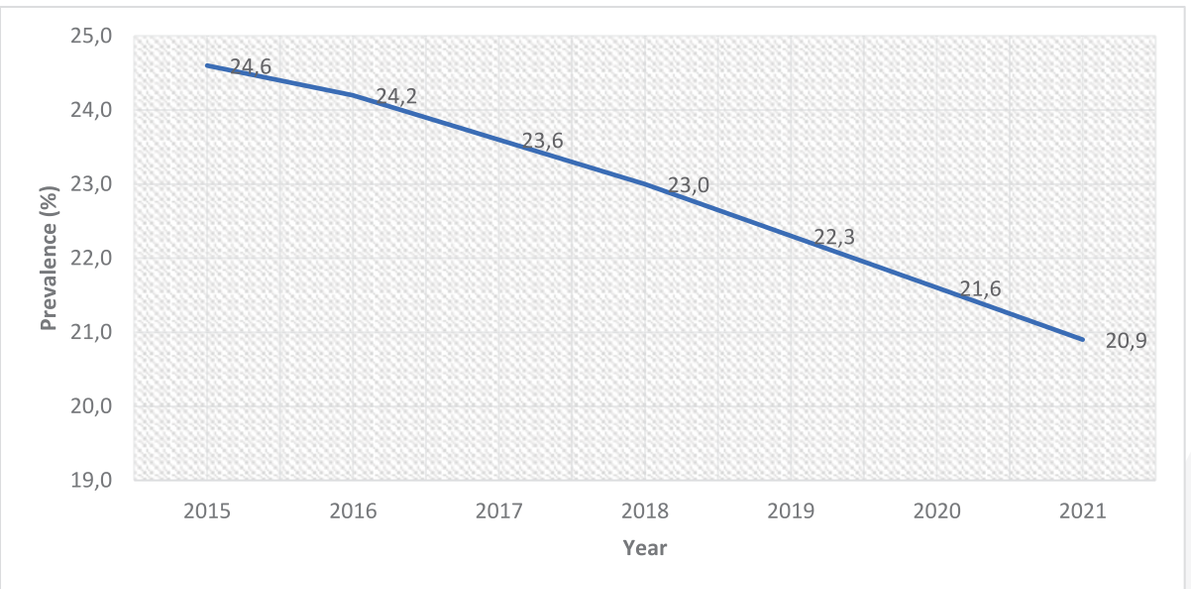



**Figure 1.2: HIV Prevalence in Lesotho of Population Aged 15-49 Years, 2015 – 2022**
*Source: World Bank Data.*

The government provides around one-third of the funding for its HIV response, relying mainly on international investments (UNAIDS 2021). Despite significant progress, there are still gaps in achieving the first 90 target of the 90-90-90 strategy, and targeted testing is needed for early diagnosis of individuals unaware of their HIV-positive status. The country has also made efforts to expand HIV self-testing, index testing, and partner notification services. Nevertheless, at least 10,000 new infections were observed from 2015 to 2023 as presented in Figure 1.3, widening the gap from the set target (Government of Lesotho 2018). Marginalized population groups, such as sex workers, are disproportionately affected, with around 64% of sex workers estimated to have HIV (UNAIDS 2021). The high prevalence and incidence of HIV in Lesotho make it essential to

intervene quickly, despite the challenges in controlling the epidemic. The government has been working on comprehensive strategies for providing integrated health services for HIV (Schwitters et al. 2022; Thin et al. 2019; UNAIDS 2021).

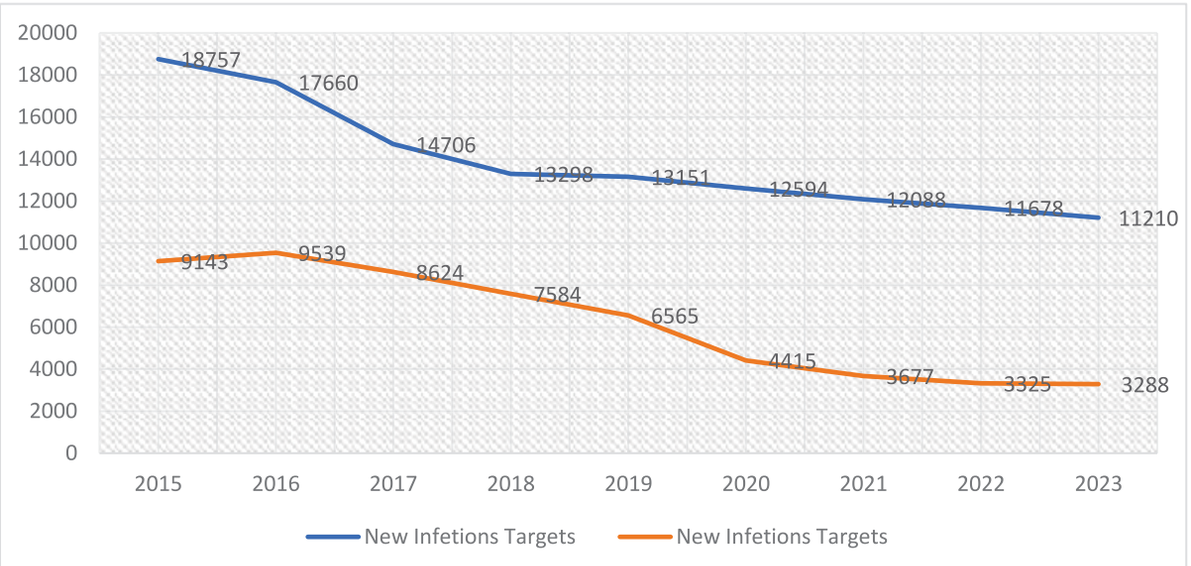



**Figure 1.3: Trends in New HIV Infections Against Fast Track Target, 2015-2023 (All Ages)**
*Source: National HIV & AIDS Strategic Plan 2018/19 – 2022/23.*

There is limited information available on the most common STIs in Lesotho. However, according to research, syphilis and chancroid are the dominant STIs in eastern and southern Africa, including Lesotho; both are ulcerative STIs that greatly increase the probability of HIV transmission (Population Reference Bureau 2007). Some studies also found that active syphilis infections among men who have sex with men (MSM) in parts of southern Africa, including Lesotho, have a prevalence of up to 5.3% (Stahlman et al. 2015).

Figure 1.1 further shows the movement in GNI per capita from 1990 to 2022. The GNI is a crucial economic indicator that includes the average income earned by each individual in a country. Analysing the movement in GNI per capita for Lesotho provides insights into the economic aspects of the country's human development. The GNI per capita exhibited fluctuations in the early 1990s but in general it showed growth, reaching the peak of US$2748 in 1998. The percentage increase during this period was 14.89% translating to an average annual growth of 1.86%. From 1999 to 2004, the GNI per capita remained relatively stable but declined slightly in 2004 with a percentage decrease of 2.06%. Probably this decline was a result of political unrest that prevailed in late 1998 whereby there was large-scale damage to property and loss of jobs which led to a high rate of unemployment. Although the GNI started to fluctuate again from 2005 to 2009, the overall

trend showed recovery, reaching US$3080 in 2008. The percentage increase during this period was 14.85% translated to an average annual increase of 4.95%. This increase could have been driven by the establishment of the Lesotho Revenue Authority (LRA) to manage the Government's revenue policy and also the introduction of Value Added Tax (VAT) in 2003 as an effective mechanism for tax management. During the years 2010 to 2015, the GNI per capita showed stability with subsequent growth. The percentage increase in this period was 1.56%. However, a steady decline in growth was observed from 2016 to 2022, reaching US$2710 in 2022. The percentage decrease during this period was 17.23% yielding an average annual decline of 3.45%. Possibly this decrease was driven by a decline in net current transfers as a result of a fall in SACU receipts and more recently the decline in the economy caused by the effects of the COVID-19 pandemic. As a result, in 2020 the Lesotho National Strategy (LNTS) 2021-2025 was adopted to bolster the competitiveness of the economy to promote economic diversification and uphold employment and income growth.

### Human development indices: constraints and opportunities for technology and Innovation

To conclude this section, it is important to draw on some conventional data based on the Human Development Report to analyse the status of education and academic institutions in Lesotho, comparing it with available regional data. In general, Lesotho has a lower-than-average human development index compared to other countries in the region, including the other former high commission territory.

**Table 1.2: Comparable National Human Development Index and Components (2022)**

| | Human Development Index | Life expectancy | Expected years of schooling | Mean years of schooling |
|---|---|---|---|---|
| Botswana | 0.708 | 65.9 | 11.4 | 10.4 |
| Eswatini | 0.610 | 56.4 | 14.9 | 5.7 |
| Lesotho | 0.521 | 53.0 | 11.1 | 7.5 |

*Source: Human Development Report, 2023/2024.*

The poor performance including in education is most worrying when compared with that of countries that used to form part of the University of Botswana, Lesotho and Swaziland. The performance needs to be analysed further given that previous reports credited education with being the strongest performer in the Human Development Report (UNDP, 2015). It is important to note, however, that Lesotho's statistics at Gross Enrolment Ratio of 10.2% in 2018, although significantly worse than Botswana's 27% in 2019 (UNESCO, 2021), would appear to be better than Eswatini's last figure of 7.75% in 2013. Even poorer performance in relation to higher

education would not be surprising when further analysis is undertaken given that Lesotho also performs poorly compared to the same countries in the provision of such critical services to the knowledge economies as electricity and internet connectivity according to the Human Capital Project[4].

Lesotho's energy output, based as it is largely on conventional sources, is at a low 72 MW[5] catering for a mere forty-seven percent (47.4%) of the entire population and a low eleven percent (11.4%) of the rural population (World Bank, 2021). By comparison, the same source puts electricity coverage in Botswana at 73.7% of the population and Eswatini at eighty-three percent (82.9%)[6]. Although the Government of Lesotho aims to expand access to electricity to 75%, including an increase in renewable energy access by 500 MW by 2030, it will still be way below where the other countries are. Therefore, academic institutions need to be called upon to play a more significant role in developing sustainable energy. In particular, the Master of Science in Sustainable Energy offered by the National University of Lesotho needs to be mainstreamed into undergraduate programmes.

Although the emergence of mobile financial services has transformed financial inclusion, Lesotho's digital technology adoption remains low, based on fifty-nine (59%) percent of network coverage with less than fifty percent (50%) of the population using the internet (UNDP, 2023, citing Digital 2023: Lesotho). The same report further reveals that much of the mobile technology usage remains for voice, social messaging and short messaging systems and that access to high-speed internet is low. This means that digital technology is being used more for basic social and economic activities rather than transformative purposes such as education and research. It is further argued by the same report that the continued measurement of digital technology adoption through the penetration of telephones is that it remains at the level of consumption rather than production, which means that technology adoption is not yet used to unlock creativity and knowledge generation. She reflects that the fault lies with a lack of 'intentionality' in the form of policy and intervention in education to promote critical thinking skills even at early stages beyond just basic computations.

[4] Accessed on the World Bank website: https://www.worldbank.org/en/publication/human-capital on 16/11/2023
[5] https://www.usaid.gov/powerafrica/lesotho
[6] https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS.

## 1.2 Other Human Development Challenges in Lesotho

While HDI captures the core of the human development process, challenges posed by poverty and inequality undermine progress made in human development. As a result, other measures of human development have been considered. These include the Inequality-adjusted Human Development (IHDI), the Gender Development Index (GDI), the Gender Inequality Index (GII) and the Multi-dimensional Poverty Index (MPI).

### 1.2.1 Inequality-adjusted Human Index (IHDI)

The IHDI was introduced in 2010 to account for inequality in all three dimensions of the HDI by 'discounting' each dimension's average value according to its level of inequality. In other words, the difference between the HDI and the IHDI represents the 'loss' in human development due to inequality. As the inequality in a country increases, the loss in human development also increases. Thus, IHDI allows a direct link of inequalities in dimensions of the HDI and the resulting loss in human development. It can help inform policies towards inequality reduction and to evaluate the impact of various policy options aimed at inequality reduction.

**Table 1.3: Lesotho's IHDI Relative to Selected Countries and Regions, 2022**

| Country / Region | IHDI Value | Overall Loss (%) | Coefficient of Human Inequality (%) | Inequality in Life Expectancy at Birth (%) | Inequality in Education | Inequality in Income |
|---|---|---|---|---|---|---|
| **Lesotho** | **0.332** | **36.3** | **34.8** | **33.6** | **19.6** | **51.4** |
| Zimbabwe | 0.370 | 32.7 | 30.6 | 24.4 | 14.6 | 52.9 |
| Zambia | 0.344 | 39.5 | 36.0 | 24.1 | 20.4 | 63.4 |
| Low HDI | 0.341 | 34.0 | 33.8 | 28.9 | 39.2 | 33.4 |
| SSA | 0.303 | 33.9 | 33.6 | 27.9 | 33.6 | 39.4 |
| LDC | 0.363 | 33.0 | 32.7 | 23.4 | 36.2 | 38.6 |

*Source: Human Development Report, 2023/2024.*

In 2022, Lesotho's HDI stood at 0.521 while the IHDI stood at 0.332, after discounting for inequality (Table 1.3). This implied an overall loss of 36.3% due to inequality, with life expectancy-

related inequalities of 33.6 percent and income-related inequalities of 51.4 percent playing a major role. According to the Lesotho Ministry of Health (MOH) 2020, the prevalence of HIV among adults in Lesotho was 22.7%, which corresponds to approximately 324,000 adults living with HIV. HIV prevalence was markedly higher among women (27.4%) than among men (17.8%). Furthermore, it is reported that Lesotho has now met all 90-90-90 targets among adults (ages 15 years and older) living with HIV. The country has surpassed the overall target for 2020 to have more than 73% of all adults living with HIV achieving viral load suppression (VLS). Although the country's HIV program has made great strides according to the Lesotho MOH 2020, gaps remain with HIV prevalence that is higher among women than men. When it comes to income-related inequalities, according to FINMARK TRUST (FMT) 2021, approximately 73% of Basotho's livelihoods were negatively affected by the COVID-19 pandemic in 2020. Basotho either had their income reduced, whilst others stopped working or got retrenched and failed to operate their businesses. As a result, Basotho experienced severe distress in terms of managing or balancing their income and expenses. This distress may indicate the hardships that Basotho people were facing.

The IHDI value of 0.332 shows that at the most one-third of Lesotho's human development potential remains unrealised due to inequality. However, compared to other countries and regions, Lesotho's loss in human development due to inequalities is less than that of Zambia, with an overall loss due to inequality of 39.5%. The average loss due to inequality for low IHDI countries is 34.0%, Sub-Saharan African (SSA) countries 33.9% and least developed countries (LDC) 33.0%.

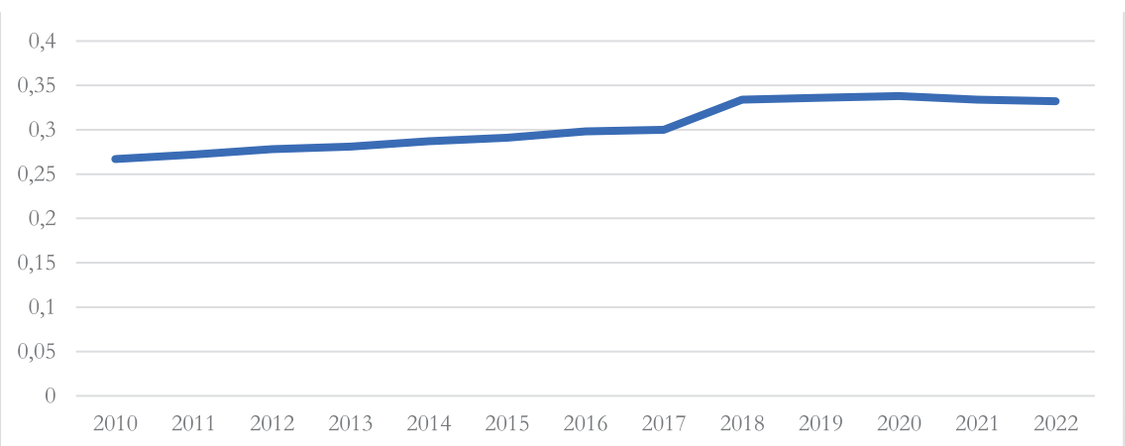



**Figure 1.4: Lesotho IHDI from 2010 to 2022**
*Source: Human Development Report, 2023/2024.*

According to Figure 1.4, the Lesotho IHDI depicts a continuous increase from 2010 with 0.267 to 2020 with 0.338, before starting to decrease in 2021 and 2022. The increase was driven by the high inequality in life expectancy that ranged between 33.7% and 34.9% from 2010 to 2020 and the high inequality in income of 63.0% that was consistent from 2010 to 2017. The IHDI showed a high percentage overall increase of 26.6% during the years 2010 to 2022.

Figure 1.5 depicts Lesotho's human development losses from inequality. The figure shows that Lesotho's overall human development loss due to inequality has gradually improved since 2018. The loss was as high as 63.0% in the years 2010 to 2017 and it improved to 51.4% from 2018.


**Figure 1.5: Lesotho Human Development Loss from Inequality**
*Source: Human Development Report, 2023/2024.*

For Lesotho to achieve sustainable human development, interventions should be targeted to improve life expectancy and reduce income inequalities.

### 1.2.2 Gender Development Index (GDI)

The GDI measures gender achievements by accounting for disparities between females and males in three basic dimensions of human development: health (measured by female and male life expectancy at birth); education (measured by female and male expected years of schooling and mean years of schooling) and command over economic resources (measured by female and male estimated GNI per Capita).

HDI is adjusted for inequalities in the achievements of males and females to measure the degree of equality. The GDI and HDI would have the same values if gender equality existed. According to table 1.4, the 2022 female HDI value for Lesotho is 0.519 in contrast with 0.520 for males, resulting in a GDI value of 0.999, placing the country in group 1 with high equality achievements between men and women. On the other hand, the GDI values of 0.936 and 0.930 for Zimbabwe and Zambia respectively, placed both countries in GDI group 3. On average the GDI values of low HDI countries, SSA countries and LDC were 0.868, 0.915 and 0.890, respectively.

**Table 1.4: Lesotho's GDI Relative to Selected Countries and Category in 2021**

| HDI Rank | Country/Region | GDI Value | HDI Values | | GDI Group |
|---|---|---|---|---|---|
| | | | Female | Male | |
| 159 | Zimbabwe | 0.936 | 0.532 | 0.568 | 3 |
| 153 | Zambia | 0.930 | 0.548 | 0.589 | 3 |
| **168** | **Lesotho** | **0.999** | **0.519** | **0.520** | **1** |
| -- | Low HDI | 0.868 | 0.478 | 0.551 | -- |
| -- | SSA | 0.915 | 0.525 | 0.574 | -- |
| -- | LDC | 0.890 | 0.509 | 0.572 | -- |

*Source: Human Development Report, 2023/2024.*

Figure 1.6 shows that the Lesotho GDI decreased significantly from 1.033 in 1997 to 0.941 in 2006 and remained almost constant, with little change, for almost 15 years from 2008 to 2022. This decrease was driven by an increase in expected years of schooling and mean years of schooling for both females and males. The improvement may be because Lesotho enacted several progressive laws that are meant to address gender inequalities. The most salient ones are: 1) Land Act of 2010 which allows equal access to land by men and women, it attempts to harmonise the existing national laws and financial institutions' regulations on land as collateral, 2) Gender Policy 2003 and Gender and Development Policy (2018-2030) which were designed to establish and sustain support systems for encouraging equal participation of women and men, girls and boy in development and also uplifting and empowering men, women, boys and girls and all minority groups.

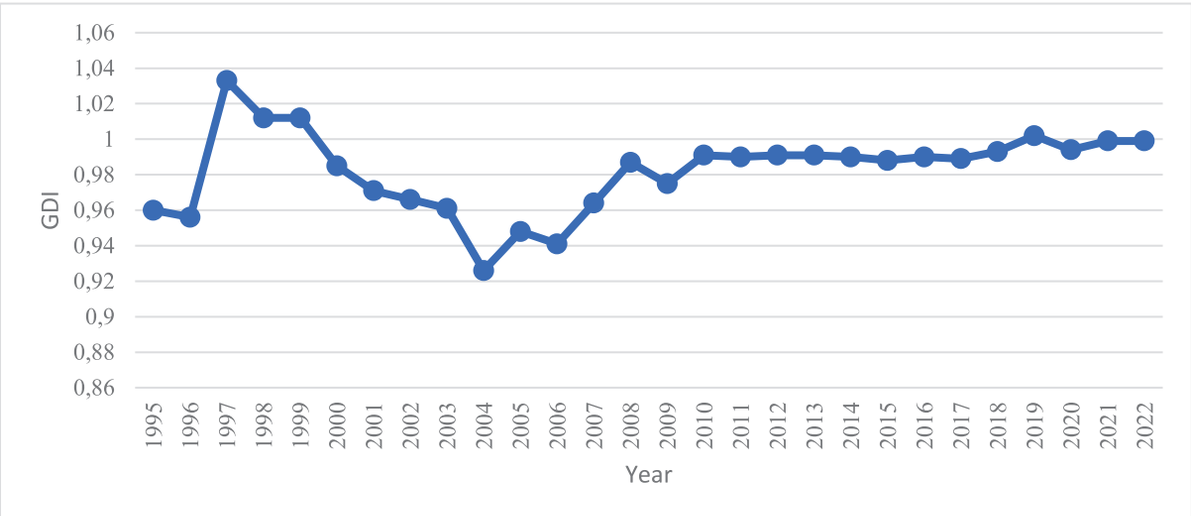



**Figure 1.6: Lesotho GDI for the Years 1995 to 2022**
*Source: Human Development Report, 2023/2024.*

Figure 1.7 presents the trends in HDI for males and females in Lesotho, respectively. The results reveal that females experienced a downward trend in HDI from 0.457 in 1995 to 0.426 in 2005, accounting for a decrease of 6.8%. From 1997 to 2006 both males' and females' HDI showed slight fluctuations before increasing from 0.453 in 2006 to 0.530 in 2020 for males and from 0.426 to 0.527 for females. While both female and male HDI values improved, a persistent gender gap was observed. Males had higher HDI values than females since the year 2000, except in 2019, indicating ongoing challenges related to gender equality in various human development dimensions.

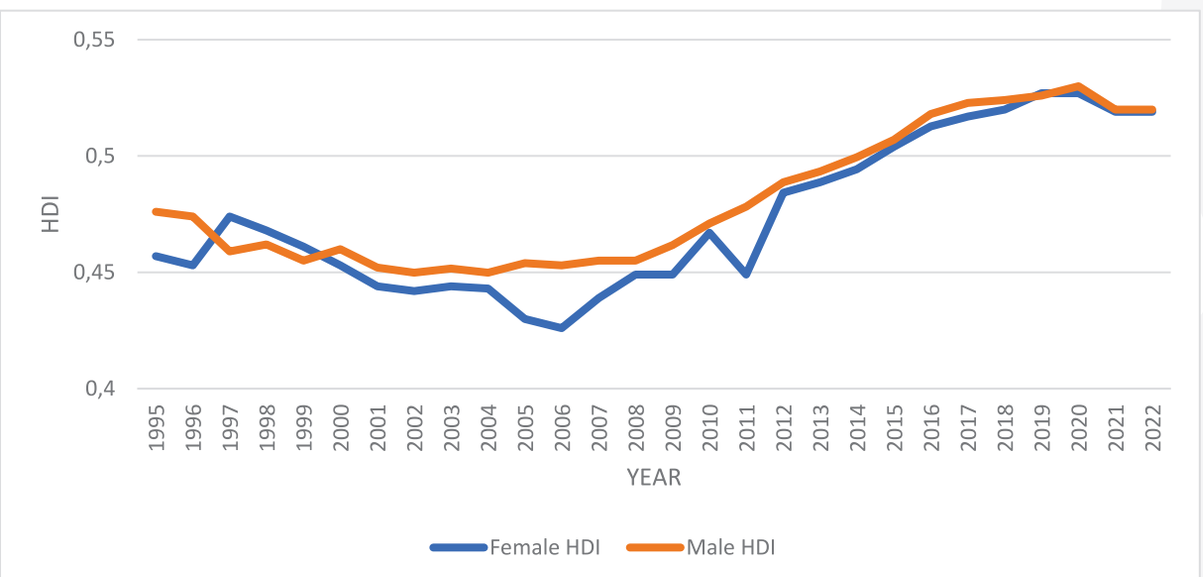



**Figure 1.7: Lesotho Male and Female HDI from 1995 to 2022**
*Source: Human Development Report, 20232024.*

Life expectancy is a crucial indicator reflecting the overall health and socio-economic condition of a population. Figure 1.8 presents the trend in the life expectancy at birth for both males and females from 1995 to 2022. The results show that Lesotho witnessed a decline in life expectancy from 1995 to 2006, with a subsequent recovery from 2006 to 2020. This recovery signifies potential improvements in the health system and socio-economic conditions. Over the observed period, a consistent gender gap in life expectancy is evident, with females consistently living longer than males.

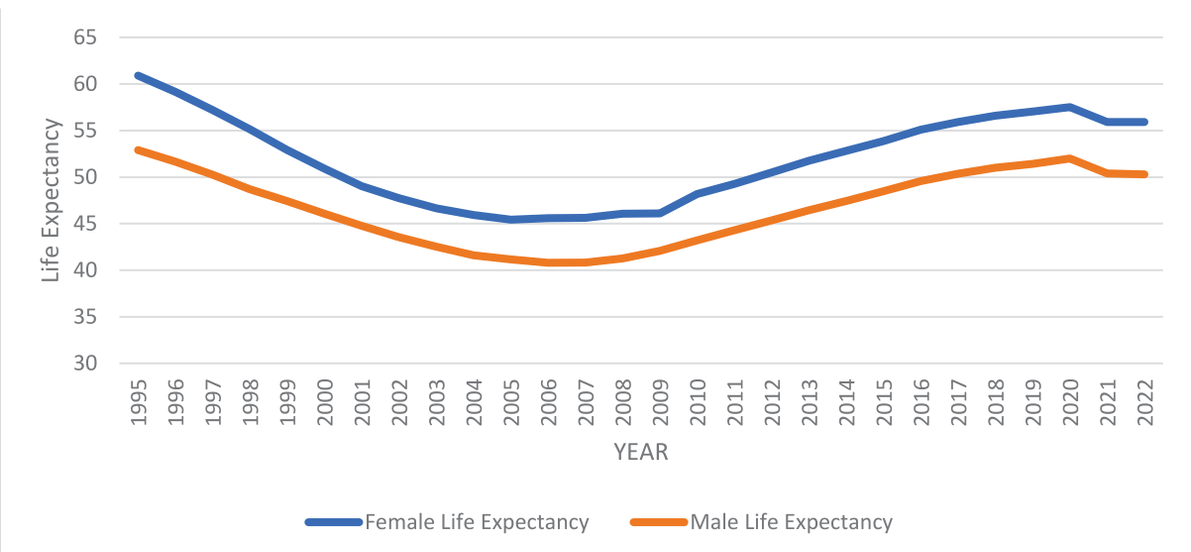



**Figure 1.8: Lesotho Male and Female Life Expectancy at Birth for the Years 1995 to 2022**
*Source: Human Development Report, 2023/2024.*

In 1995, the female life expectancy was 60.9 years, while the male life expectancy was 52.9 years, accounting for a difference of 15% between the two groups (Figure 1.8). The results further show that in 2022, female life expectancy was 55.9 years while male life expectancy was 50.3 years. The results reveal a persistent gender gap throughout the observed period with females' life expectancy being higher than that of males. This is despite several studies in Lesotho showing the high prevalence of HIV/AIDS among females as opposed to their female counterparts. Addressing this gender gap requires Lesotho to advocate for and implement policies that prioritise gender-sensitive healthcare, education, and socio-economic development to ensure inclusive human development.

GNI per capita is a key indicator reflecting the economic well-being of a population. Figure 1.9 demonstrates the trends in GNI per capita disparities in Lesotho between males and females. The results show that throughout the observed period, there exist consistent gender disparities, with

males generally having higher GNI per capita than females. In 1995, the GNI per capita was US$3237 for males compared to US$11176 for females while in 2022 GNI per capita stood at US$3304 for males compared to US$2129 for females in the same period. The gap is still existing but decreased considerably from 175% in 1995 to 55% in 2022. Perhaps this is explained by the fact that since 1995, fewer females have been active in the labour force compared to males (see Figure 1.13. These disparities raise concerns about unequal economic opportunities and potential limitations on the capabilities and freedom of females in Lesotho. As a result, Lesotho should explore factors contributing to these gender disparities, promote initiatives for females in the workforce, and ensure that economic policies and programmes are gender-responsive.

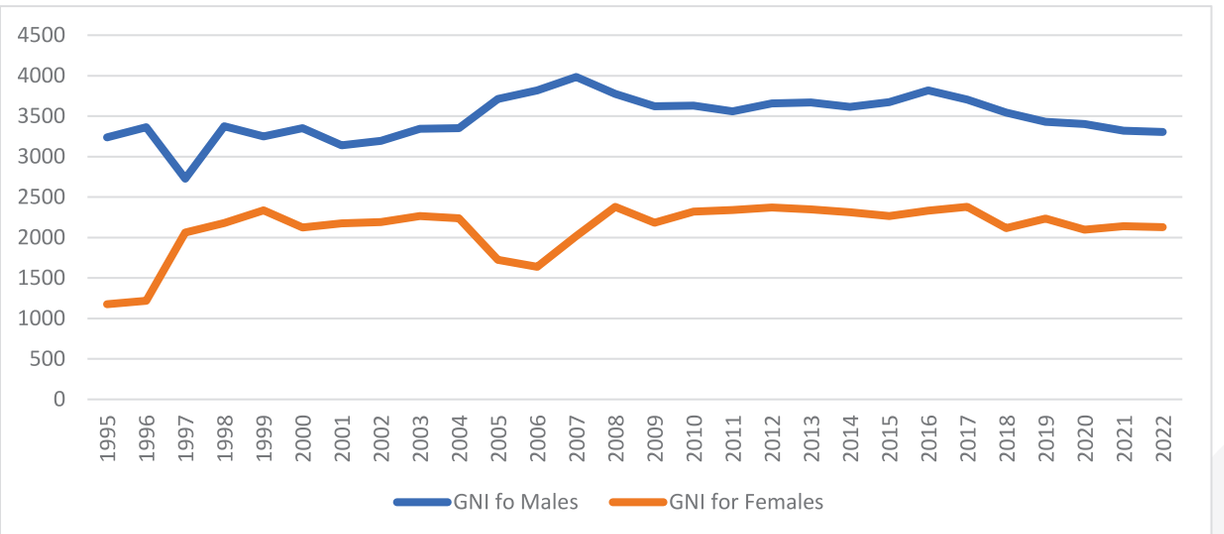



**Figure 1.9: Lesotho Male and Female GNI per Capita for the Years 1995 to 2022**
*Source: Human Development Report 2023/2024.*

### 1.2.3 Gender Inequality Index (GII)

Another measure that is used to measure the progress of human development is the GII. It reveals gender disparities in reproductive health, empowerment and labour force participation. Table 1.5 presents Lesotho's GII relative to other countries and regions. According to the table, Lesotho with a GII of 0.552 in 2022 is ranked 141 out of 166 countries at a low human development level. Compared with the other countries, GII values for Zimbabwe and Zambia are 0.519 and 0.526. In 2022 the average GII of low HDI countries, SSA countries and LDC were 0.579, 0.565 and 0.556, respectively. Lesotho is ahead of all selected countries and regions except Low HDI countries in terms of low adolescent birth rates. Lesotho's female share of parliamentary seats is among the lowest with an exception of Zambia. Lesotho also significantly lags behind all the

selected countries in terms of maternal mortality ratio, percentage of males with at least secondary education and male labour force participation.

**Table 1.5: Lesotho's GII Relative to Selected Countries and Categories in 2022**

| GII Rank | Country/ Region | GII Value | MMR | Adolescent Birth Rate | Female Seat in Parliament | Population With at Least Some Secondary Education | | Labour Force Participation Rate | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Female | Male | Female | Male |
| 132 | Zimbabwe | 0.519 | 357 | 92.6 | 33.6 | 63.4 | 73.6 | 60.0 | 71.6 |
| 137 | Zambia | 0.526 | 135 | 116.1 | 15.1 | 33.7 | 51.4 | 54.2 | 66.4 |
| **141** | **Lesotho** | **0.552** | **566** | **89.1** | **26.0** | **34.1** | **29.7** | **51.6** | **65.0** |
| -- | Low HDI | 0.579 | 497 | 88.3 | 24.0 | 21.3 | 31.9 | 50.8 | 77.5 |
| -- | SSA | 0.565 | 516 | 99.3 | 26.4 | 30.9 | 42.0 | 63.9 | 76.4 |
| -- | LDC | 0.556 | 354 | 99.4 | 25.1 | 23.4 | 33.8 | 50.4 | 75.5 |

*Source: Human Development Report, 2023/2024.*

Figure 1.10 depicts that the Lesotho GII declined continuously from 2006 (0.599) and reached its lowest level of 0.552 in 2022. The decline in GII is associated with the maternal mortality ratio that increased from 632.1 deaths per 100,000 live births in 2006 to as high as 1096.2 deaths per 100,000 live births in 2009.

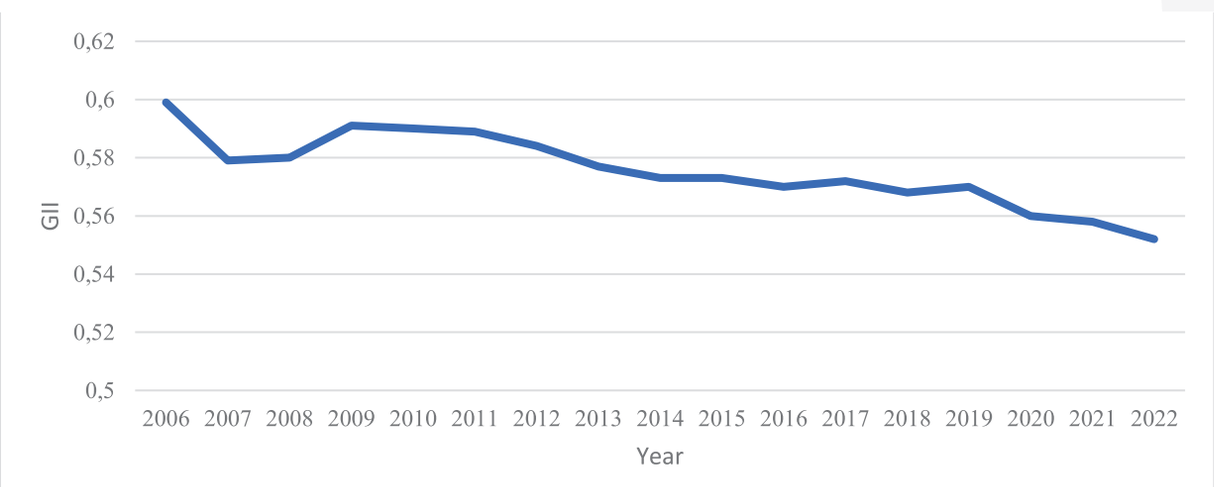



**Figure 1.10: Lesotho GII for the Years 2006 to 2022**
*Source: Human Development Report, 2023/2024.*

Furthermore, maternal mortality rate (MMR) decreased from 1096.2 deaths per 100,000 deaths in 2009 to 556 deaths per 100,000 deaths in 2022. Despite some progress, Lesotho's maternal mortality ratio is still more than twice the global average. Some of the factors that have been identified contributing to this high MMR include delays in maternal care; namely delays in deciding to seek health care by the woman or her family, delays in reaching health care facility and delays in receiving care at the facility, sepsis, abortion complications, obstructed labour, pre-eclampsia, and haemorrhage (Nkosi 2016; Steele et al. 2019). Other literatures discovered that obstetric haemorrhage and hypertensive disorder contribute to the escalating mortality rates in Lesotho (Lebuso and De Wet- Billings 2022). Lesotho could improve its maternal mortality by removing user fees and strengthening its healthcare system (Steele et al. 2019).

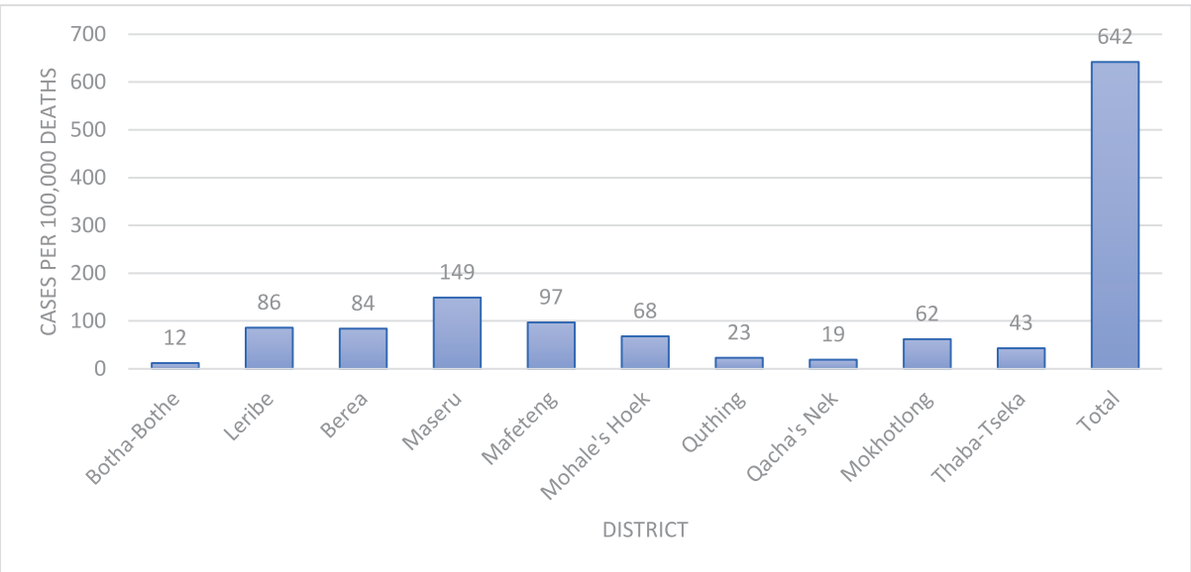



**Figure 1.11: Number of Reported Maternal Deaths by District, 2021 LDS**
***Source: 2021 Lesotho Demographic Survey.***

Figure 1.11 depicts the maternal mortality ratio (MMR) by censuses and surveys in Lesotho. MMR has declined from 618 to 540 deaths per 100,000 live births in the past five years. Relative to other LDS's, it increased from 419 estimated in 2001 to 540 deaths per 100,000 live births recorded for 2021. A comparison of the two consecutive surveys reflects a decline from 1143 that was estimated in 2011 to 540 deaths per 100,000 live births estimated in 2021 LDS.

Figure 1.12 illustrates the distribution of parliamentary seats between males and females from 1990 to 2021. The results reveal a consistent pattern of male dominance throughout the observed years. From 1990 to 2002, the share of parliamentary seats held by males increased from 88.8% to 89.3%. A notable shift occurred in 2003, where the percentage decreased to 83% indicating a potential recognition of the importance of gender diversity in political representation. Conversely, the share

of parliamentary seats held by females remained relatively low ranging from 11.2% in 1990 to 10.7% in 2002. Subsequent years witnessed a gradual increase in female representation reaching 26.8% in 2012 before declining to 22.9% in 2021. While this demonstrates progress, the gender gap remains significant, despite the introduction of the National Assembly Electoral Act 2011. This act prescribes that when a political party submits its list of proportional representatives (PR) candidates, the candidates must not only appear in order of preference, but women must alternate with men on the list. This electoral gender quota is limited to 40 out of 120 seats in the National Assembly. This raises the issue of whether electoral gender quotas effectively enhance female representation in Lesotho's legislative bodies. These figures again do not meet the targets set out in Article 12(1) of the SADC Protocol on Gender and Development, which stipulates that, by 2015, at least 50 per cent of decision-making positions in the public and private sectors are to be held by women. There is a need for Lesotho to embark on other strategic approaches that will ensure a fair representation and participation of women and men in public life, including in leadership public and private sector positions, fostering an environment where diverse perspectives contribute to holistic human development.

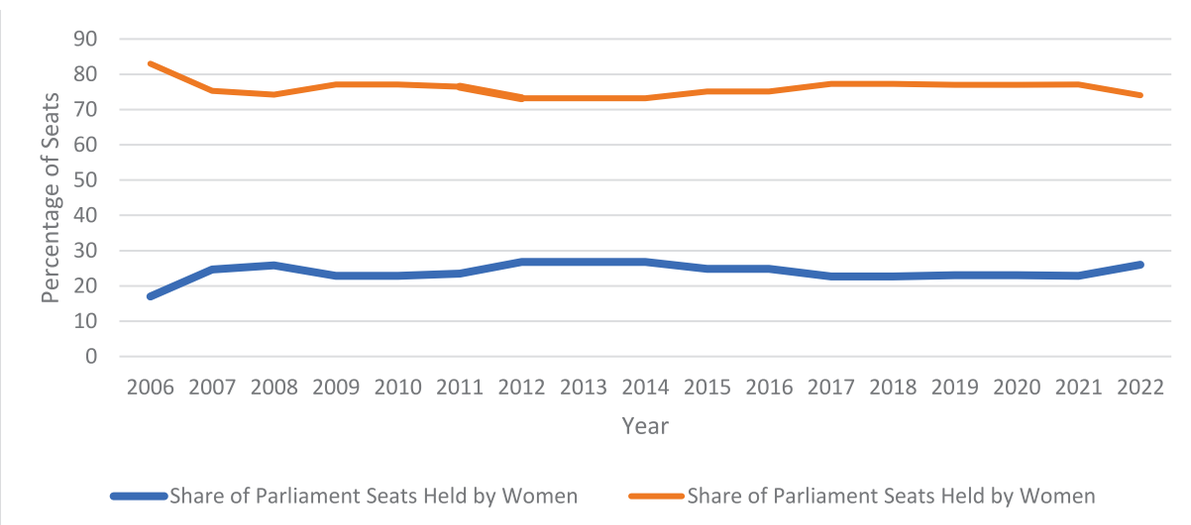



**Figure 1.12: Lesotho Representation on Parliament Seats Held by Males and Females**
*Source: Human Development Report, 2023/2024.*

Figure 1.13 shows the trends in male and female labour force participation rates from 1990 to 2021. The results show that male labour force participation has experienced a gradual decline over the past 30 years. In 1990, the rate was relatively high at 83.8% and has since exhibited a downward trend, reaching 71.3% in 2021. This decline may have been attributed to various factors, including shifts in economic structures, and advancements in technology. In contrast, the results reveal that labour force participation experienced a more stable pattern, with slight fluctuations. In 1990

female labour force participation stood at 67.1% in 1990 before reaching its maximum of 67.5% in 1999.

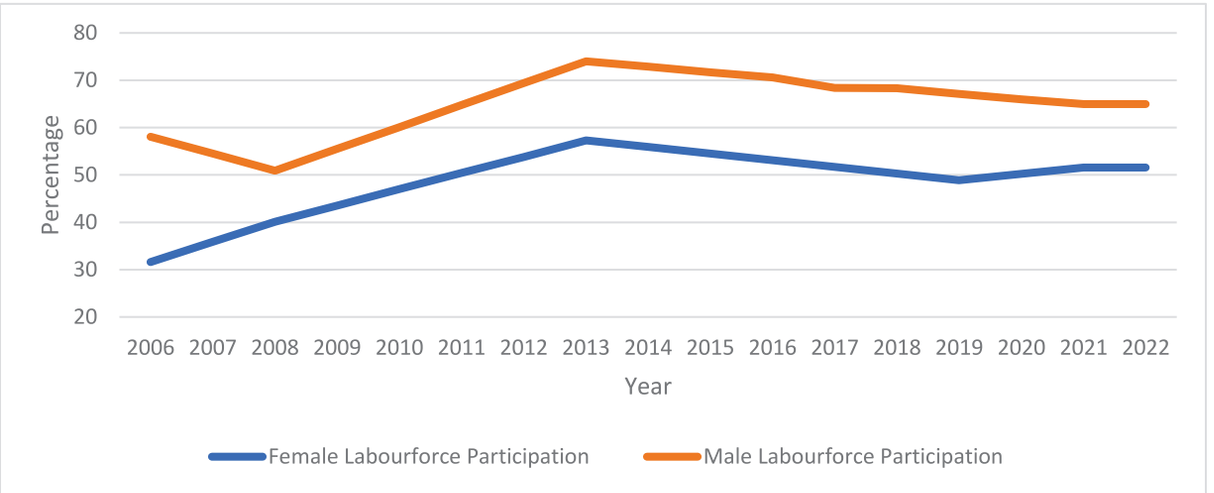



**Figure 1.13: Labour Force Participation Rates by Sex from 2006 to 2022**
*Source: Human Development Report, 2023/2024.*

The results also show a decline in female labour force participation from 67.5% in 1999 to 56.1% in 2021. From the results, it is evident that the gender gap in labour force participation exists. While male participation rates have experienced a consistent decline, female rates have shown slight fluctuations. This gap reflects ongoing challenges related to gender equality in the workforce and this suggests the need for targeted policies and initiatives that would bridge the gap and promote equal opportunities for both men and women.

## 1.3 Multi-dimensional Poverty Index (MPI)

The multi-dimensional poverty index identifies multiple household deprivations in health, education and standard of living. The health and education dimensions are each based on two indicators while the standard of living is based on six indicators. All these indicators needed to calculate the MPI for a household are taken from the same survey. The indicators are weighted to create deprivation scores which are computed for each household in the survey. A deprivation score of 33.3% is used to distinguish between the poor and non-poor. If the household deprivation score is 33.3% or greater, the household is classified as multi-dimensionally poor. The household with deprivation scores greater than or equal to 20%, but less than 33.3% are in near multi-dimensional poverty.

Table 1.6 compares the components factored into the calculation of the MPI for Lesotho and several countries and region in 2023. The data on indicators that were used to calculate the MPI for Lesotho were from the Multiple Indicator Cluster Survey (MICS) (2018). The results show that the value of the MPI for Lesotho 0.084 is lower than that of Zambia 0.232, Zimbabwe 0.110 and Sub-Saharan African (SSA) countries 0.262. These results can be explained by the fact that Zambia, Zimbabwe and SSA have relatively high poverty headcounts when it is compared with Lesotho. The breadth of deprivation (intensity) for Lesotho, which is the average deprivation score experienced by people in multi-dimensional poverty, is 43% and is lower than that of Zambia (48.8%) and the SSA average (52.9%). This indicates that on average people who were identified as poor in Lesotho were deprived in 43% of the weighted indicators. This is because in recent years, the Government of Lesotho (GoL) has enacted laws impact of implementation is yet to be realized. Such laws among others include the Companies Act of 2011 and other laws concerning economic transactions and property rights (Paramaiah et al, 2020).

The results further show that the multi-dimensional headcounts in Lesotho, Zambia and Zimbabwe are 30.1, 3.5 and 12.5, percentage points lower than the income poverty line. This reveals that the proportion (49.7%) of individuals in Lesotho who were living below the poverty line in 2018 is higher than the proportion (19.6%) of individuals who were identified as poor in the same year by 30.1%. This means that in 2018 there were individuals who lived below the poverty line yet they were not identified as poor concerning their health, education and standard of living. On the other hand, in the SSA region on average, the multi-dimensional headcount is 8.4 percentage points above the income poverty line. This implies that individuals living above the poverty line in the SSA region may still suffer deprivations in health, education and living conditions.

In addition, Table 1.6 shows the percentage of the Lesotho population with selected countries and region that are vulnerable to poverty, with a deprivation score between 20% and 30%, and that live in severe poverty with a deprivation score of 50 or more. These results show that Lesotho has the highest proportion (28.6%) of individuals that are vulnerable to poverty followed by Zimbabwe with 26.3% while the SSA region is the least with 18.6% of such individuals. This by several factors such as decreased remittance inflows that Lesotho citizens formerly received from their migrant family members working in South African (SA) mines, declines in livestock productivity as stock theft and rangeland deterioration have made animal husbandry an unattractive source of income resulting in high unemployment rate. In the case of individuals living in severe poverty, Lesotho is relatively better off when it is compared with its counterparts because

it has the lowest proportion (5%) of such individuals, followed by Zimbabwe with the second smallest proportion (6.8%). The SSA region has the highest proportion (27.9%) of individuals who live in severe poverty when it is compared with other regions.

**Table 1.6: Lesotho MPI Relative to Selected Countries and Regions**

| Country /Region | Survey Year | PPP $2.15 a day | MPI Value | Multi-dimensional Poverty Head Count (%) | Intensity of Deprivation | Vulnerable to Poverty | Severe Poverty | Below Income Poverty Line |
|---|---|---|---|---|---|---|---|---|
| Zimbabwe | 2019 | 39.8 | 0.110 | 25.8 | 42.6 | 26.3 | 6.8 | 38.3 |
| Zambia | 2018 | 61.4 | 0.232 | 47.9 | 48.8 | 23.9 | 21.0 | 51.4 |
| **Lesotho** | **2018** | **32.4** | **0.084** | **19.6** | **43.0** | **28.6** | **5.0** | **49.7** |
| SSA | -- | 37.4 | 0.262 | 49.5 | 52.9 | 18.6 | 27.9 | 41.1 |

*Source: Human Development Report, 2023/2024.*

Table 1.7 presents the Lesotho MPI for the years 2009, 2014 and 2018. The results show a decreasing trend in MPI from 0.195 in 2009 to 0.084 in 2018, indicating an improvement in Lesotho's multi-dimensional poverty over this period that in 2018 members of the households who were living in poverty were deprived in 8.4% of all the potential deprivation they could experience. This translates to 56.9% decrease in the proportion of households who were living in acute poverty from 2009 to 2018, indicating that the country improved significantly in reducing poverty. The reason behind this decline could be the establishment of many programs that were aimed at the vulnerable elderly and children including, 1) the Orphans and Vulnerable Children (OVC) Bursary program established in 2000, 2) the Old Age pension (OAP) initiated in 2004 and 3) Child Grant Program (CGP) launched in 2009. According to the table the percentage of people living in multi-dimensional poverty has shown a decline from 42.3% in 2009 to 19.6% in 2018. This decrease suggests a positive trend in lifting people out of poverty. The multi-dimensional poverty headcount percentage has also seen a consistent decrease over the years. In 2009, the intensity was 46.2%, which decreased to 45% in 2014 and further to 43% in 2018. This indicates an improvement in the depth of deprivation among the poor people in Lesotho. In addition, the table presents the results on the contribution to deprivation by each dimension.

**Table 1.7: Lesotho MPI Over Time**

| Yea | MPI | Multi-dimensional Poverty Head Count (%) | Intensity of Deprivation | Contribution to Deprivation in Dimension to overall Multi-dimensional poverty (%) | | |
|---|---|---|---|---|---|---|
| | | | | health | Education | Standard of living |
| 2009 | 0.195 | 42.3 | 46.2 | 33.8 | 14.8 | 51.4 |
| 2014 | 0.128 | 28.3 | 45.0 | 30.8 | 13.9 | 55.3 |
| 2018 | 0.084 | 19.6 | 43.0 | 21.9 | 18.1 | 60.0 |

*Source: Human Development Report, 2023/2024.*

The contribution of health-related deprivations to overall MPI has decreased from 33.8% in 2009 to 30.8% in 2014 and 21.9% in 2018, suggesting a positive advancement in healthcare and the well-being of the population. Education-related deprivations have shown a decrease from 14.8% in 2018 to 13.9% in 2014, indicating an improvement in education. However, they showed an increase from 13.9% in 2014 to 18.1% in 2018. Lastly, the contribution of living standard-related deprivations has increased from 51.4% in 2009 to 55.3% in 2014 and to 60% in 2018. It is recommended that the government increases its investment in the implementation of the Lesotho Food and Nutrition Strategy and Action Plan (LFNSAP) which contains 22 nutrition-specific and nutrition-sensitive interventions and 18 interventions related to enabling environment.

### 1.3.1 Assessment of Individuals Deprivation

Some of the indicators under two of the three dimensions of the MPI (education and standard of living) have been used to assess the deprivation of individuals at the national and sub-national (district) levels. The assessed individuals were members of households that were included in the 2021 LDS. The MPI could not be calculated for the Lesotho NHDR 2023 using the 2021 LDS, as the most recent survey, mainly because this survey unlike the Health and Demographic Survey (HDS) and Multiple Indicator Cluster Survey does not have data on some of the indicators under the standard of living and health dimensions. Instead, two components of MPI, multi-dimensional headcount ratio and intensity or depth of poverty, were calculated.

### 1.3.2 Interpretation of Multi-dimensional Headcount Ratio and Intensity of Poverty

The national multi-dimensional headcount ratio (H) was calculated as $\frac{38771}{92144} = 0.421$, where 92144 is the total number of people of the households (population) included in the 2021 LDS with the data on the indicators used to compute the H and, 38771 is the number of members in the households who were identified as multi-dimensionally poor with respect to the education and standard of living dimensions. The national value of H (0.421) indicates that 42% of people in the households were identified as multi-dimensionally poor, meaning that they were living in acute poverty. This implies that they were deprived at least in either all indicators of one dimension (education or standard of living) or a combination of indicators across the two dimensions used to calculate H. The intensity of poverty score (A) was calculated as $\frac{17378.484}{38771} = 0.448$, where $17378.484$ is the sum of the censored deprivation scores. This indicates that on average people who were in the studied households and were identified as poor were deprived in 45% of the weighted indicators of the education and standard of living dimensions.

Similarly, the multi-dimensional headcount ratio and intensity of poverty score were calculated for each of the ten districts in Lesotho, and the results are presented in Table 1.8. Mokhotlong appears with the highest values for both the multi-dimensional headcount ratio (0.689) and intensity poverty score (0.486). It is followed by Thaba-Tseka with the multi-dimensional head count ratio of 0.611 and intensity of poverty score of 0.475. This shows that 69% and 61% of people in the households that were included in the 2021 LDS in Mokhotlong and Thaba-Tseka respectively, were identified as multi-dimensionally poor. Meaning that each of the two districts had more than half of the households that were studied in 2021 that were living in acute poverty. The implication of this is that such households suffered deprivation at least in either all indicators of one dimension (education or standard of living) or a combination of indicators across the two dimensions used to calculate H for Mokhotlong. The intensity of poverty scores of Mokhotlong shows that on average people in the households who were identified as poor were deprived in 49% of the weighted indicators of the education and standard of living dimensions.

**Table 1.8: Multi-dimensional Headcount Ratio and Intensity of Poverty by District**

| District | Multi-dimensional Headcount ratio | Intensity of Poverty |
|---|---|---|
| Butha - Buthe | 0.468 | 0.444 |
| Leribe | 0.274 | 0.413 |
| Berea | 0.324 | 0.430 |
| Maseru | 0.266 | 0.443 |
| Mafeteng | 0.394 | 0.410 |
| Mohale's Hoek | 0.440 | 0.450 |
| Quthing | 0.490 | 0.442 |
| Qacha's Nek | 0.489 | 0.448 |
| Mokhotlong | 0.689 | 0.486 |
| Thaba-Tseka | 0.611 | 0.475 |

*Source: Author's calculation.*

Maseru has the lowest value of multi-dimensional head count ratio (0.266), followed by Leribe (0.274). These values show that Maseru and Leribe, both with 27% of people who were identified as poor, were better off when they are compared with the rest of the districts in terms of having people, in the studied households, that were identified as multi-dimensionally poor and living in acute poverty. On the other hand, Mafeteng appears with the least intensity of poverty score of 0.410 and it is followed by Leribe with 0.413. This implies that Mafeteng with the multi-dimensional head count ratio of 0.394, has 39% of people in the households who were identified as multi-dimensionally poor. These people were deprived in 41% of the weighted indicators of the education and standard of living dimensions. The observations from these results suggest that there is a need to direct interventions that would create an enabling environment for people to access education and have opportunities that will improve their standard of living in all the districts.

## 1.3 Human Development Measure- Lesotho Initiative

The standard HDI measures the average achievement in a country in three dimensions of human development: a long and healthy life, access to knowledge and a decent standard of living. It has become a widely used tool for assessing relative progress towards achieving sustainable development goals across the globe. The innovation in the standard HDI that resulted with the Lesotho Technology HDI draws from the theme of the 4th Lesotho NHDR '**Harnessing Technology and Innovations to Accelerate Human Development in Lesotho'.** The Lesotho Technology HDI includes information and communications technology (ICT) as the fourth dimension to make the HDI a more comprehensive approach to measuring a nation's human development. Integrating ICT in measuring human development brings in a perspective of human development that is driven by enabling an environment for people to enjoy long, healthy and innovative lives, improved access to resources as well as interactive and collaborative learning, and hence improvement of people's standard of living.

The health dimension is measured by the life expectancy index, which is defined as the average number of years that a newborn could expect to live if he or she were to pass through life exposed to the sex- and age-specific death rates prevailing at the time of his or her birth, for a specific year, in a given country, territory, or geographic area. It is assessed by life expectancy at birth, measured in years of living a long and healthy life. Life expectancy is the most commonly used measure to describe a population's health. It is calculated using a tool called a life table, which shows the probability that a person will die before his or her next birthday.

The education dimension is measured by the mean years of schooling for adults aged 25 years and more and the expected years of schooling for children of school-entering age. The mean years of schooling is the average number of completed years of education of a country's population, excluding years spent repeating individual grades while the expected years of schooling is the total number of years of schooling that a child of a certain age can expect to receive in the future, assuming that the probability of their being enrolled in school at any particular age is equal to the current enrolment ratio for that age. Gross national income (GNI) per capita measures the standard of living dimension. GNI per capita measures the achievement of a decent standard of living as one of the three key dimensions of human development.

The last index is the Information and Communication Technology (ICT) index which is measured by mobile phone subscriptions, households with a computer and households with internet access. Mobile phone subscriptions denote the number of households who own a mobile phone while

households with a computer denote the percentage of households with a computer. Households with internet denote the percentage of households that have access to the internet from home by any device. The 2023 standard HDI for Lesotho stood at 0.555, which suggests an improvement in human development compared to the past years. Including access to electricity and ICT services in the calculation puts the HDI at 0.5394, which is relatively low when compared with the standard HDI with the 2.81 % decrease.

Compared with the 2021 Lesotho HDI, the Lesotho Technology HDI of 0.5088 is relatively low after including the combined ICT index, computed from three sub-indices, namely mobile phones subscriptions index, computer ownership index and the internet access index. The combined ICT index was calculated as 0.392. The computer ownership index and internet access index appearing with the smallest values, 0.134 and 0.369 respectively are the contributing factors to the low combined ICT index. The low combined ICT index calls for a concerted effort to come up with policies and interventions that will be directed towards increasing internet access and promoting computer ownership by different groupings of people. Computers and the internet are essential technological aspects that facilitate continuous and innovative learning to acquire evolving knowledge that can improve livelihoods and contribute to human development.

**Table 1.9: Comparison of the Standard HDI with the Lesotho HDI from 2015 - 2021**

| HDI | Years | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
| **Std HDI*** | 0.508 | 0.518 | 0.522 | 0.525 | 0.528 | 0.530 | 0.522 | 0.521 |
| **Lesotho HDI** | 0.488 | 0.506 | 0.517 | 0.490 | 0.502 | 0.500 | 0.509 | |

*Source: Human Development Report 2023/2024 and author's calculation.*

Table 1.9 presents the standard HDI and the Lesotho Technology HDI, which include ICT as the fourth dimension, during the years 2015 to 2021. Although the Lesotho HDI is consistently smaller than the standard HDI throughout this period, the two indices have been increasing except in 2018 when the Lesotho Technology HDI decreased from 0.517 in 2017 to 0.490 in 2018 and started increasing thereafter. An increase in the Lesotho Technology HDI can be attributed to an improvement in the number of entities with computers and internet connectivity in businesses, health facilities and accommodation establishments from 2009 to 2013 (LCA, 2013). Internet connectivity using dial-up services has declined due to a shift to faster technologies with larger data-carrying capabilities. There has been a notable increase in the use of mobile phones due to a notable decline in the number of entities that had fixed telephones.

## 1.4 Challenges and Progress on the State of HD in Lesotho

Over time, Lesotho's Human Development Index has shown a dynamic trajectory. Despite difficulties in the early 1990s and mid-2000s, the nation has advanced admirably in the last several years. However, sustaining strong development patterns and addressing variations may require ongoing work. A deeper examination of particular contributing variables, like healthcare, education, and economic inequality, would offer a more thorough picture of the human development environment in Lesotho. In terms of IHDI, the percentages of overall loss offer important information about how well each nation and area is doing to achieve its potential for human growth. Targeted interventions become essential tactics to improve general well-being, especially in lowering income and educational gaps. These insights can be used by policymakers to create inclusive policies that tackle particular issues and promote sustainable human growth.

Furthermore, subtle trends over varying periods are shown by analysing the percentage increases in the Female and Male HDI values (GDI). The gender gap still exists even though both genders have made progress, highlighting the necessity for ongoing initiatives to promote equal and holistic human development. To create a more inclusive and just world, Lesotho must continue to prioritise eliminating gender inequalities.

Moreover, even though the results show progress in terms of the share of parliamentary seats, there is still a sizable gender gap. As such, efforts to ensure an equitable distribution of parliamentary seats are necessary to create an atmosphere where different viewpoints support holistic human development. It is also clear from the data that there is a gender difference in labour force participation. The rates of female participation have fluctuated little, whereas the rates of male participation have consistently declined. This disparity indicates the need for focused policies and actions that would close the gap and advance equal opportunities for men and women. It also demonstrates persistent issues with gender equality in the workforce.

Lastly, even though Lesotho has problems with multi-dimensional poverty, especially when it comes to vulnerability and the degree of deprivation, the nation has a better overall state of affairs than certain other nations and the SSA region. The Human Development Approach highlights that to fully improve the well-being of the population in Lesotho, efforts must be made to target particular aspects of poverty and guarantee advancements in living standards, health, and education.

# CHAPTER 2

## CURRENT AND FUTURE STATUS OF TECHNOLOGY AND INNOVATION IN LESOTHO

## 2.1 EMPLOYING TECHNOLOGY AND INNOVATIONS FOR PUBLIC SERVICE DELIVERY, EFFECTIVENESS AND EFFIECIENCY IN LESOHO

The Fourth Industrial Revolution has reshaped governance and service delivery worldwide, with Information and Communication Technologies (ICTs) playing a pivotal role. In Lesotho, strides have been made in implementing e-governance, enhancing accountability and transparency. However, disparities in technology access persist, especially in rural areas, exacerbating the digital divide and efficiency biases. Challenges such as inadequate infrastructure and legislative frameworks hinder the full realization of e-governance's benefits. Technological advancements have historically improved human well-being, yet their effects are contingent on institutional and societal contexts. While innovations like e-governance hold a promise for Lesotho's economic growth, coordinated efforts are required to ensure equitable access and benefits. The role of academic institutions is crucial in this regard, as they not only impart knowledge but also generate solutions to socioeconomic challenges. Aligning with UNDP's strategic plan, academic institutions can drive transformative change through digitalization and innovation.

### 2.1.1 E-Governance and Infrastructure: Building a Resilient Digital State

The Fourth Industrial Revolution has transformed the way institutions and people interact and work in different set ups. Technological innovations through e-governance have paved way for accountable and transparent, effective and efficient ways of governance and service delivery in the Lesotho public sector. The Government of Lesotho has made some strides and progress in implementing e-governance across the 10 districts of the country. It can be noted that some infrastructures (hardware and software) have been implemented and operationalized together with some legislative frameworks that govern the adoption and operationalization of e-government in Lesotho. E-government in Lesotho has indeed transformed service delivery and has promoted accountable, transparent, effective and efficient service delivery particularly in the Maseru district, which happens to be the capital city. E-governance has also created efficiency for everyone especially those in the rural areas. However, it can thus be noted that there are disparities in terms

of technology, with the rural areas being marginalised, thus leading to the digital divide inequality, and efficiency biases.

The absence of supporting infrastructure and the dearth in robust comprehensive legislative frameworks makes it difficult for Lesotho to enjoy the full benefits of e-governance in so far as service delivery is concerned. E-governance does not bring about the much-anticipated social inclusion, equality, or transparency. In actuality, the implementation of e-government presents a number of difficulties with regard to adoption, acceptability, and utilization for both users and governments. Additionally, the study also established that there is an imbalance between e-government investment (EGDI) and low acceptance and utilisation (EPI). It is however imperative that the Government should invest more in installing e-government related infrastructure, systems processes and mechanisms especially in rural areas, so as to narrow the gap in terms of technological access between the rural and urban dwellers. There is also need to establish a robust and comprehensive regulatory framework for supporting the holistic implementation of e-governance in Lesotho; as well as engaging development partners to help invest in ICTs. There is also a need for the decentralisation of ICT infrastructure to all the 10 districts. Citizen engagement, education and awareness creation on ICT-related initiatives, processes and systems. The Government of Lesotho (GoL) should also set up modern cyber-security technologies to track and report cyber-security threats.

### 2.1.2 The Lesotho E-Government Landscape: ICT and Infrastructure Indicators

Governments worldwide are increasingly recognizing the imperative of modernization and good governance through the adoption of Information and Communication Technologies (ICTs) (UNESCAP, 2009). These technologies play a crucial role in enhancing service delivery and fostering transparency. However, challenges persist, particularly in developing nations, where bureaucratic inefficiencies have hindered access to services (Ruhode, 2013). ICTs have revolutionized governmental service delivery, interactions with citizens, businesses, and internal operations worldwide. Nevertheless, e-government practitioners in many developing nations face the challenge of prioritizing ICT solutions that address governance issues while aligning with public preferences and expectations (Mawela, Ochara & Twinomurinzi, 2017; Munyoka, 2017).

Citizens today are more informed and demand higher standards from their governments, largely influenced by technological advancements (OECD, 2016:1). The implementation and adoption of e-government initiatives vary based on governments' socio-political agendas (Munyoka, 2017).

While developing economies encounter obstacles hindering successful implementation, developed economies have benefited greatly. Progressive governments recognize the importance of citizen-centric, participatory decision-making to improve service delivery. Individuals' perception of themselves as stakeholders has increased acceptance and success of e-government efforts, particularly in industrialized nations (Munyoka, 2017). This evolution has seen e-government systems progress from static content provision to citizen-centric models that solicit input for decision-making processes before policy implementation.

### 2.1.3 The Lesotho e-Government Landscape: ICT and Infrastructure Indicators

ICT infrastructure serves as the cornerstone of e-government, providing the essential platform for connectivity and the delivery of electronic services (e-services) (Munyoka, 2017). It encompasses physical structures, software, and hardware facilitating connectivity and interconnectivity. Emerging trends in e-government adoption also emphasize leveraging cloud computing, open government data, cybersecurity, digital inclusion for aging populations, interoperability, and the establishment of one-stop e-services and e-local government through kiosks, alongside proactive communication, consultation, and citizen education.

Currently, Lesotho's ICT infrastructure is predominantly owned by private entities, facilitating network access and providing the backbone structure for information dissemination. However, challenges persist, particularly in the backbone structure, with base stations primarily concentrated in urban areas despite noted improvements in infrastructure development (Lesotho Communications Authority, 2017). The e-government landscape in Lesotho encompasses fixed and mobile telecommunications, broadcasting, multimedia, and the internet, interconnected with vital services such as postal services, banking, and e-commerce. In the knowledge economy era, the utilization of e-Government and ICTs is paramount for fostering sustainable enterprises. Recognizing that technology encompasses not only machinery and software but also knowledge and processes, technical expertise and literacy emerge as crucial components (World Bank Group, 2017).

In 2015, government expenditure on research and development in Lesotho amounted to USD 0.44 million, representing a mere 0.01% of the GDP (Mathaha, 2015). This low investment in research and development has hindered the advancement of e-government initiatives in the country. However, the government is actively promoting the adoption of technologies for various applications, particularly in sectors such as climate-resilient agriculture, healthcare, ICT,

manufacturing digitization, and the green economy. Emphasis is placed on technical training to facilitate a swift transition towards these emerging areas. The Lesotho e-government project, aligned with the Country Strategy Paper (CSP) of 2013 to 2017, focused on infrastructure development and institutional capacity building. These efforts aimed to enhance governance, accountability, and democratic stability in the country (Lesotho Communications Authority, 2017). By addressing institutional capacity challenges through ICT, the project aimed to improve internal government operations and promote efficient citizen engagement, facilitating access to information and services.

The e-government project in Lesotho facilitated significant infrastructure developments, including the establishment of open-access concepts in fibre submarine cable systems and Virtual Landing Points for a landlocked country like Lesotho. Additionally, metropolitan fibre networks were established, along with fibre links from Maseru to Mohale's Hoek, and the installation of telecommunications towers in rural areas. Cloud computing adoption, server expansion, and data centre capacity improvements were also notable outcomes. Furthermore, the Government E-Portal was established to centralize services such as the call centres, line ministries, and the national portal (Lesotho Communications Authority, 2017). Strengthening the core government-controlled fibre network infrastructure involved optimizing existing metropolitan fibre networks, enhancing bandwidth access for e-government services, and extending ICT coverage to four rural areas under the Universal Access Programme.

### 2.1.4 Institutional and Legislative Frameworks for e-Government in Lesotho

The Government of Lesotho (GoL) is actively engaged in improving access to digital public infrastructure through collaborations with institutions such as the Lesotho Communications Authority (LCA), the Universal Service Fund (USF), and telecommunications licensees like Econet Telecom Lesotho and Vodacom Lesotho. Recognizing the crucial role of digital public infrastructure in achieving development goals, the government is focusing on initiatives to enhance broadband access in rural areas, promote financial inclusion through digital financial services, and expand access to digital government services (eServices). Additionally, efforts are underway to refine policy frameworks to support the country's digital transformation agenda (Ministry of Information Communications Science Technology and Innovation).

Lesotho's framework for e-Government and ICT is guided by a series of policies and regulations, including the ICT Policy of 2005, the Lesotho Communications Policy of 2008, and the Data

Protection Act of 2011, among others. These policies aim to ensure widespread access to affordable and equitable ICT services and support Lesotho's progression towards an "information economy." However, despite the existence of these frameworks, there is a notable absence of a distinct national policy solely dedicated to ICTs and e-Government in public sector service delivery. This gap hampers the coordination of ICT deployment and the realization of unrestricted access to ICT services, posing challenges to the effective implementation of digital initiatives (Ministry of Information Communications Science Technology and Innovation).

Privacy and data protection are addressed through various legislative measures, including the Data Protection Act of 2011 and the Communications Act of 2012. These laws aim to safeguard personal information and regulate telecommunications and broadcasting sectors, ensuring the integrity and security of communication networks and platforms. Additionally, recent legislative efforts, such as the Electronic Transactions and Communications Bill of 2022 and the Computer Crime and Cyber Security Bill of 2023, seek to further strengthen cybersecurity measures and establish comprehensive frameworks for regulating e-government services and combating cybercrime. These initiatives reflect the government's commitment to ensuring the safety and security of digital transactions and communications within the country (Ministry of Information Communications Science Technology and Innovation).

The National Strategic Development Plan I (NSDP) 2012/13-2016/17 and NSDP II 2018/19-2022/23 underscore the critical role of ICTs in achieving national priorities and developmental objectives. While these plans prioritize the development and deployment of e-government services and platforms, progress in implementation has been slower than anticipated, leading to a gap between envisioned objectives and realized outcomes. As a result, an extension of NSDP II to 2027/28 has been proposed to further restructure the ICT sector, enhance human capacity development, and stimulate economic growth through the widespread adoption and utilization of ICT applications and information content. These strategic initiatives aim to leverage ICTs as enablers of socio-economic development and inclusive growth, with a particular focus on bridging the digital divide and fostering digital inclusion across all segments of society (Ministry of Information Communications Science Technology and Innovation).

Despite the comprehensive legislative and strategic frameworks in place, Lesotho faces several challenges in implementing e-government initiatives. These challenges include a fragmented approach to e-government policies, outdated regulatory frameworks, and limited institutional capacity for policy implementation and enforcement. Addressing these challenges requires concerted efforts to enact, adopt, and operationalize a unified policy framework supporting e-

government and ICT development in Lesotho. By establishing a harmonized regulatory environment, the government can facilitate the comprehensive implementation of e-government initiatives, thereby promoting inclusive digital transformation and economic growth. Moreover, investing in human capital development and capacity-building initiatives will be crucial for equipping citizens with the skills and competencies needed to fully participate in the digital economy and society, ensuring that no one is left behind in the journey towards a digitally empowered future (Ministry of Information Communications Science Technology and Innovation).

### 2.1.5 E-Government, Service delivery and development in Lesotho

This section explores the effectiveness of e-government in enhancing service delivery and fostering development in Lesotho. Despite challenges such as poor ICT infrastructure and high levels of poverty, Lesotho has taken initial steps to promote increased deployment, access, and usage of e-government services within its communities. Limited evidence suggests that Lesotho is leveraging technology in delivering public services such as healthcare, education, commerce, and government information dissemination. According to Munyoka (2017), a primary objective of e-government adoption is to deliver public services to various stakeholders (citizens, government, businesses, and employees) in a more convenient, citizen-centric, and cost-effective manner. Given the diverse needs of different categories of government stakeholders, the benefits and effectiveness of e-government adoption in Lesotho can be best understood through various e-government domains: G2C (Government to Citizen), G2E (Government to Employee), G2G (Government to Government), and G2B (Government to Business). These domains will also elucidate the ultimate outcomes of the e-government initiatives implemented in Lesotho.

**Table 2.1: The Efficacy of e-Government Adoption**

| E-government Domain | Potential Benefits |
|---|---|
| **Government to Citizens (G2C)** | • Savings in transport to government offices<br>• Savings in time for accessing government services<br>• Improved service delivery to citizens<br>• Broader choice of channels for accessing government services<br>• Greater citizen involvement in government policy and decision making<br>• Provision of sustainable economic development through projects<br>• Citizen empowerment through access to public information<br>• Offers ground breaking opportunities. |
| **Government to Employees (G2E)** | • Improved internal efficiency in communication (e.g. online leave application and salary advice)<br>• Greater and efficient access to internal information, policies and training opportunities<br>• Improved job satisfaction due to the modernisation of internal operations. |
| **Government to Business (G2B)** | • E-procurement and e-tendering benefits<br>• Improved export and import turnaround time and compliance with regulations<br>• Enhanced efficacy and quality business transactions. |
| **Government to Government (G2G)** | • Improved administrative efficacy<br>• Increased employee throughput and productivity<br>• Cost savings through improved operations, open data and reusable applications<br>• Greater revenue returns on e-government investment<br>• High service availability, reliability and data quality. |

*Source: Author's Construction.*

In June 2013, the Government of Lesotho took an initiative to roll out e-government services – an initiative that was budgeted at US$8.55 million and was expected to be finalised by 2018 (Lesotho Communications Authority, 2017). To date, the government of Lesotho has set up a government portal (www.gov.ls) which is used as the gateway to access the visibility of public institutions which have an online presence. The table below shows some ministries in Lesotho which have set up websites and have functional Uniform Resource Locator (URL) as of 2020. Important to note is that the government of Lesotho had 26 ministries.

**Table 2.2: Availability of the websites of the ministries of the Government of Lesotho**

| Ministry | Website | Functional URL |
|---|---|---|
| Ministry of Finance and Development Planning | www.finance.go.ls | Yes |
| Ministry of Forestry, range and soil conservation | www.forestry.gov.ls | Yes |
| Ministry of Tourism, Environment and Culture | www.mtec.gov.ls | Yes |
| Ministry of Development planning | www.planning.gov.ls | Yes |
| Ministry of Health | www.health.gov.ls | No |
| Ministry of Gender, Youth, Sports and Recreation | www.gender.gov.ls | No |
| Ministry of Foreign Affairs and International Affairs | www.foreign.gov.ls | No |
| Ministry of Labour Employment | www.labour.gov.ls | No |

*Source: Author's Construction.*

Matsieli and Sooryam (2021) revealed that only 8 out of 26 ministries in Lesotho had functional websites, indicating a significant gap in online presence. Moreover, functional URLs were scarce, suggesting limited functionality in delivering e-government services. However, since 2022, there has been notable progress, with 15 line ministries now operating functional websites, marking an improvement in the accessibility of e-government services to the public. The imperative to improve government websites is underscored by the need to enhance access to e-government services for the public. These platforms facilitate interactions between the government and citizens, offering a range of benefits such as cost and time savings, improved service delivery, and empowerment through access to public information. Studies by Munyoka (2017) and the International Labour Organization (2014) highlight these benefits, emphasizing the transformative potential of e-government platforms in enhancing governance and service delivery.

Aligned with the Country Strategy Paper (CSP) of 2013 to 2017, Lesotho's e-government project has led to significant reforms in service delivery across various line ministries. These reforms prioritize citizen-centric, socially inclusive, and participatory governance systems, aiming to

maximize development outcomes and ensure sustainable service delivery. By embracing e-government initiatives, Lesotho seeks to foster sustainability in both national and local governance systems across its ten districts, thereby promoting social inclusivity and participation throughout the country. The implementation of e-government initiatives has notably enhanced the processing and storage capabilities of various ministries in Lesotho. Through the reinforcement of data centres and the adoption of up-to-date applications, there has been increased productivity and efficiency within government institutions. Citizens using government portals and designated rural centres now experience considerable time savings that would otherwise be spent travelling to physical government offices. Moreover, the improved speed and quality of service have minimized the need for multiple visits to government agencies to achieve desired outcomes.

In tandem with efforts to enhance control, monitoring, and supervision of public resources, the government initiated the Public Finance Management reform support project, aligning with e-government reforms. Leveraging ICTs, this project successfully enhanced the quality and timeliness of public finance information, along with the effectiveness of public spending (World Bank, 2021). Achievements include improvements in financial reporting timeliness and transparency, as well as enhanced reliability of financial data. These e-government reforms significantly influence the allocation, management, and expenditure of public funds, thereby contributing to overall national development. The Government of Lesotho (GoL), in collaboration with partners like the African Development Bank (ADB), has embarked on the development of a Government ePayment Gateway (GePG) under the eGov Infrastructure Project. This initiative aims to digitize government payment and revenue collection systems through the National Payment Switch (Leswitch), thereby promoting financial inclusion and modernizing payment processes in Lesotho. By integrating with various payment service providers, the GePG streamlines payment processes across government ministries, reducing redundancy and enhancing efficiency (Sello, 2024).

The introduction of the GePG aligns with the GoL's commitment to ensuring interoperable and composable systems while eliminating duplicative agreements with multiple service providers. This initiative also aims to enhance accountability by mapping identities to government-to-citizen (G2C) payments, thereby reducing instances of fraudulent claims and ghost beneficiaries. The newly launched system facilitates seamless interaction between different mobile money platforms and ensures that domestic payments are efficiently processed within Lesotho (Thuseho, 2024). Similarly, the Central Bank of Lesotho's (CBL) launch of Leswitch contributes to promoting financial inclusion and reducing reliance on South Africa's payment infrastructure. The GePG also

supports revenue collection and enhances the distribution of grants, salaries, and refunds, fostering efficient government-to-government (G2G) and government-to-business (G2B) transactions.

Experience with e-government portals globally has demonstrated significant benefits, including greater transparency, improved access to information, and enhanced participation in government processes. In Lesotho, the expansion of e-government initiatives such as the GePG contributes to modernizing service delivery and promoting citizen engagement. For instance, the National University of Lesotho (NUL), in partnership with Econet Telecom Lesotho (ETL) and the UNDP Accelerator Lab, developed the Bophelo-Ka-Mosebeletsi (BKM) application to strengthen community-based health systems and manage the COVID-19 response (UNDP Accelerator Lab Lesotho, 2024).

In the public health sector, the adoption of ICTs has facilitated the implementation of nationwide e-Register systems, particularly for managing HIV and tuberculosis patients. By digitizing patient records, the e-register enhances data collection, analysis, and dissemination, thereby improving patient care and monitoring. Lessons from Zimbabwe's successful implementation of a similar system underscore the potential impact of these initiatives on disease control and public health outcomes (Digital Health Atlas, 2020). Furthermore, advancements in e-government and ICTs have facilitated improvements in education and connectivity in Lesotho. While challenges persist, efforts to capitalize on connectivity and digital resources are evident, with initiatives aimed at enhancing educational research and access to free education. These developments underscore the transformative potential of technology in overcoming development barriers and improving the quality of life in Lesotho.

Despite the positive strides in e-government implementation, concerns remain about the slow progress and effectiveness of ICT policies in Lesotho. Studies have highlighted the need for improved organizational structures and citizen-centric e-government services to meet the diverse needs of the population (Mathaha, 2015; Mutula, 2008; Matsieli and Sooryamoorthy, 2021). Addressing these concerns will be crucial in providing comprehensive e-government services that align with the evolving needs of citizens and contribute to sustainable development in Lesotho. The Government of Lesotho has also successfully opened a One-Stop-Shop physical facility for vehicle registration and driver licensing at Hafoso. This facility simplifies processes related to vehicle registration and driver licensing. This facility was meant to simplify processes related to vehicle registration and licensing in Lesotho, cutting the time and costs involved by putting these services under one single facility. In addition, the Government is increasing its offer of online government-to-government services, thereby reducing compliance time. For instance, the One-

Stop-Business Facilitation Centre (OBFC) in Maseru, has been providing electronic business registration services to companies since 2014. Over 90% of the registration is done online, with the OBFC expected to be rolled out to two more districts. With the support of UNCTAD and the World Bank, OBFC is working on a new online service called e-Licence to issue trade and industrial licences. One-stop e-Government service and interoperability consist of integrated government service delivery accessed via one gateway portal by both citizens and organisations.

The development of the Lesotho Integrated Transport Information System (LITIS) with support from the World Bank marks a significant milestone in enhancing transport management across Lesotho's ten districts. This system represents a crucial shift from the Electronic National Transport Integrated System (ENATIS), promising more reliable road transport systems. Similarly, the Maseru City Council (MCC) has introduced an electronic system for issuing construction permits, streamlining the application process and facilitating online document verification by MCC officers. These advancements under the umbrella of e-government are vital for improving service delivery for the government, citizens, civil servants, and businesses by offering efficient, effective, accessible, and cost-effective services. The implementation of the e-Government project in Lesotho has digitized various services, aligning with the government's objective to expand online public services in response to growing demand. Currently, the e-Government portal offers a wide range of services, including Tourism Licensing e-Services, e-Visa systems, and e-Customs systems, among others. These initiatives have automated government services related to trade, business registration, taxation, and procurement. For instance, a digital database platform for informal Medium and Small Micro Enterprises (MSMEs) is being developed to monitor and facilitate their transition to the formal sector.

Moreover, initiatives like the Green Value Chains (GVC) project, implemented by the UNDP in partnership with the government, aim to enhance farmers' knowledge capacities and market access through the development of local value chains and the use of clean and digital technologies. The Marekeng (e-Market) Digital Platform facilitates farmers' marketing of produce and provides valuable information on production and market trends. These e-Government initiatives have expanded access to digital services in rural areas, fostering economic opportunities and sustainable livelihoods. Despite these positive reforms, trust in e-Government among the population remains low, with a preference for human interaction over online services. Addressing this challenge may require awareness campaigns to build confidence in online systems. Additionally, local businesses need encouragement to adopt digital platforms for engagement and outreach, leveraging social media platforms for wider reach. The Lesotho Government Data Network and initiatives like the Lehakoe Photobank demonstrate the government's commitment to utilizing technology for

national development. The Lehakoe platform serves as a digital repository for documenting and marketing tourist attraction sites and Basotho culture, aiming to promote tourism and cultural heritage. Multichannel options like social networking technologies allow citizens to participate in government decision-making processes, enhancing public engagement and amplifying voices in governance.

E-government initiatives prioritize investments aligned with national strategic goals, rationalizing efforts, demonstrating interconnectedness between projects, and fostering public trust and support. Improved data standardization and cross-governmental collaboration are also key objectives of e-governance, aiming to better meet the needs of citizens, businesses, and government entities. Overall, e-government drives innovation, fosters participation, and enhances service delivery, making it a vital tool for human development and governance in Lesotho.

### 2.1.6. Challenges and Complexities of E-Government, Development and Service Delivery

Lesotho, like many African countries, faces multifaceted challenges in the adoption and utilization of e-government. These challenges span from infrastructure limitations and human capacity issues to interoperability gaps, security concerns, funding constraints, digital divide, political dynamics, lack of consultations, and language barriers. Addressing these challenges requires a comprehensive understanding of the underlying issues and strategic interventions tailored to Lesotho's context.

**Infrastructure:** Despite efforts to improve ICT infrastructure, there remains a scarcity and unequal distribution of e-government infrastructure across Lesotho. The liberalization and privatization of ICT aimed to enhance access to appropriate telecommunications infrastructure, but challenges such as low penetration of fixed-line telecommunications and low teledensity persist. ICT development and e-government services are predominantly concentrated in urban areas, particularly in Maseru, leaving rural areas underserved. Consequently, service gaps emerge, hindering access to quality e-government services, particularly for rural citizens.

**Human Factor:** A significant barrier to e-government adoption is the shortage of ICT skills among government employees and citizens. Weak digital literacy, especially in rural areas and among women, poses a challenge to embracing e-government platforms. Studies have highlighted the lack of expertise among government employees in developing, operating, and maintaining e-government systems. Addressing this gap requires investment in ICT skills training and capacity-building programs targeted at government employees and citizens. By enhancing digital literacy

and ICT skills, Lesotho can empower its workforce and citizens to effectively utilize e-government services.

**Interoperability:** In Lesotho, most e-government systems operate in silos, hindering seamless communication and data sharing among government departments. This fragmented setup limits the potential benefits of e-government, such as increased efficiency and improved service delivery. To address interoperability challenges, Lesotho needs to prioritize the development of interoperable systems and standards that facilitate seamless integration and data exchange across government entities. By fostering interoperability, Lesotho can create a more cohesive e-government ecosystem that enhances service delivery and citizen engagement.

**Security and Privacy Concerns:** The adoption of e-government platforms raises concerns about security and privacy. Insufficient policies and frameworks to regulate online activities pose significant risks to the integrity of e-government systems and data. Cyber-attacks, including phishing and data breaches, can compromise the confidentiality and integrity of sensitive information. Lesotho needs to develop robust cybersecurity measures and legislative frameworks to safeguard e-government systems and protect citizen data. By investing in modern technologies and cybersecurity enforcement institutions, Lesotho can enhance the resilience of its e-government infrastructure and mitigate cyber threats effectively.

**Funding:** E-government projects require adequate funding to develop and maintain advanced IT infrastructure and online services. However, Lesotho faces financial constraints, leading to a reliance on donor support for e-government implementation. The withdrawal or reduction of donor aid, particularly in the wake of the COVID-19 pandemic, has stalled e-government projects in Lesotho. To address funding challenges, Lesotho needs to explore alternative financing mechanisms and prioritize e-government investments in national budgets. By securing sustainable funding sources, Lesotho can ensure the continuity and success of its e-government initiatives.

**Digital Divide:** Disparities in internet access and ICT skills create a digital divide, particularly between urban and rural areas in Lesotho. The lack of access to digital services exacerbates inequalities and hinders the widespread adoption of e-government. To bridge the digital divide, Lesotho needs to invest in expanding internet infrastructure and promoting digital literacy programs, especially in underserved rural communities. By improving access to digital services and enhancing ICT skills, Lesotho can promote inclusive e-government initiatives that benefit all citizens.

**Complex Political Dynamics:** Lesotho's complex political environment poses challenges to the sustained implementation of e-government initiatives. Political instability and government changes disrupt the development of comprehensive policy and regulatory frameworks, hindering progress in e-government adoption. To address political dynamics, Lesotho needs to foster cross-party consensus on e-government policies and prioritize bipartisan support for e-government initiatives. By depoliticizing e-government and ensuring continuity in policy formulation, Lesotho can create a conducive environment for sustained progress in e-government implementation.

**Lack of Consultations and Awareness:** Poor citizen involvement and awareness campaigns hinder the adoption of e-government services in Lesotho. The lack of awareness about available e-services and the skills to use them effectively contributes to low uptake among citizens. To address this challenge, Lesotho needs to conduct targeted outreach programs and awareness campaigns to educate citizens about e-government services and their benefits. By engaging citizens in the design and implementation of e-government initiatives, Lesotho can promote greater adoption and utilization of digital services.

**Language Barrier:** Government websites in Lesotho primarily use English, neglecting Sesotho, the widely spoken language in the country. This language barrier limits accessibility and hinders citizen engagement with e-government platforms. To address language barriers, Lesotho needs to provide e-government content in Sesotho and other local languages to increase accessibility and promote citizen engagement. By delivering e-government services in languages that are familiar to citizens, Lesotho can enhance inclusivity and ensure that all citizens can access and benefit from digital services.

In conclusion, addressing the challenges facing e-government in Lesotho requires a multifaceted approach that encompasses infrastructure development, capacity building, interoperability, cybersecurity, funding, digital inclusion, political stability, citizen engagement, awareness, and language accessibility. By prioritizing these areas and implementing targeted interventions, Lesotho can overcome barriers to e-government adoption and realize the full potential of digital technologies to improve service delivery and citizen participation.

*Box 1: An e-service Outlets Model: Innovative Approach for Digital Inclusion and Improved Service Delivery.*

The Government of Lesotho and other entities such as the academia and private sector have embarked on a digital transformation rollout in Lesotho. While digitalisation brings value to the holistic societal transformation, there is a possibility of excluding a more marginalised segment of society including the elderly, individuals without technology infrastructure such as computers and mobile phones, and those who lack educational and digital skills capabilities. In response to this challenge, UNDP Accelerator Lab is currently implementing an experiment for digital inclusion to sensitise public service decentralisation through e-service Outlets. Individuals can access services offered online with the assistance of outlets within their locality. The model is envisaged to solve financial challenges faced by the government to achieve citizens' digital inclusion through the engagement of the private sector in public service delivery.

**The model wants to achieve the following objectives:**

- Achieve digital inclusion and promote efficient service delivery, serving citizens with limited technological skills or lack of digital infrastructure to assist in interfacing with e-services.
- Capacitate and engage private sector (MSMEs) already working on the ICT landscape to deliver public services to citizens lacking ICT infrastructure and technology skills interface and utilise e-services.
- Ensure that MSMEs engage in best practices in cyberspace to avoid cybersecurity challenges when delivering services to the public.
- Develop an evidence base that informs the government projects to decentralise public service processes through digitalisation.

**Progress:**

- The model has been successful with e-services and users are now accessing the services locally, challenges emanating from each e-service are reported well on time within the established outlets' platform.
- The Ministry of Information Communication Science Technology and Innovation (MICSTI) is yet to develop a framework for compliance, certification, and management of e-Service Outlets to ensure good client experience eliminating cyber security and data privacy thread.
- Initiating branding and marketing initiatives for e-Services Outlets to be known and easily identifiable by the public.
- Accelerator Lab has developed M&E framework for the experiment to ensure that baseline profiles have been established for all outlets and e-services participating in the experiment.

## 2.2 THE ROLE OF TECHNOLOGY AND INNOVATION IN REDUCING POVERTY, INEQUALITY AND GENDER DISPARITIES IN LESOTHO

The history of humanity underscores the profound impact of technology and innovation on human well-being. From ancient myths to modern advancements, technology has consistently improved health outcomes, expanded access to information, and boosted food production. However, the positive effects of technology are contingent upon societal and institutional contexts that facilitate improvements in human welfare. Technological innovations have historically enhanced human well-being by eradicating diseases, improving medical care, and revolutionizing communication. For instance, vaccines have eradicated debilitating diseases like smallpox, while modern communication technologies like the Internet have democratized access to information and education. Moreover, innovations in agriculture, such as genetically modified crops and precision agriculture techniques, have significantly increased food production, addressing food insecurity concerns worldwide.

Yet, technological advancements have also led to societal challenges and disparities. The transition from a nomadic lifestyle to settled agricultural communities, for example, introduced new risks of infectious diseases and social inequalities. Similarly, the Industrial Revolution, while ushering in unprecedented prosperity, also resulted in widespread unemployment, economic insecurity, and rising inequality. In Lesotho, there are significant opportunities for technology to drive economic growth and human development. However, realizing these opportunities requires coordinated efforts to ensure that technological advancements benefit all segments of society. Governance and institutional frameworks play a crucial role in shaping the trajectory of technological change and determining who benefits from it.

### 2.2.1 Contextualizing Lesotho's Development Challenges in an Era of Technological Change

Lesotho's developmental journey necessitates sustainable approaches, harmonizing economic growth with social and environmental concerns. Investments in education, healthcare, and infrastructure are pivotal for a comprehensive development strategy. While the country's tax-to-GDP ratio has improved, reaching 20.7% in 2021, significant financial investment remains necessary for technological transition. International cooperation, particularly with UN initiatives like UNAIDS and the United Nations Development Assistance Framework (UNDAF), offers crucial resources and expertise. Lesotho's receipt of USD$177.2m in net Official Development

Assistance (ODA) in 2021, with a large portion allocated to health initiatives, underscores the importance of external aid.

Challenges such as limited ICT infrastructure, unequal access to technology, and digital literacy issues pose hurdles. Addressing these is imperative for maximizing ICT's positive impact on poverty reduction, human capital enhancement, and economic growth. Initiatives should prioritize capacitating and educating the population, integrating technology into education, and providing training for educators and administrators. Collaboration with international associations can aid in developing comprehensive ICT implementation plans, encompassing objectives, timelines, and budget considerations. Ensuring reliable internet connectivity and hardware resources is crucial, with 95% of the population covered by mobile-cellular networks in 2022, but only 47.98% using the internet in 2021. Regular monitoring and evaluation of the national ICT plan are vital for refining strategies and addressing emerging challenges.

ICT adoption in Lesotho holds promise for job creation and economic development. Strong ICT infrastructure development presents job opportunities in infrastructure development, maintenance, and expansion. As the education system focuses on communication technologies, job prospects in network management, technical support, and telecommunications engineering may increase. Entrepreneurship opportunities in software development, consultancy, and support services could emerge, fostering innovation and job creation. Additionally, increased demand for customer service and technical support roles could create job opportunities in call centres. Strategic investment in ICT infrastructure, education, and innovation-supportive policies is essential to harness the job creation potential associated with ICT adoption, contributing to economic growth and a skilled workforce.

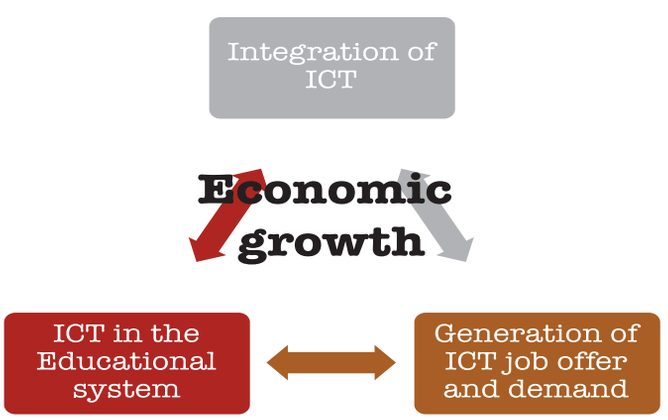



**Figure 2.1: Relation diagram of ICT integration**
*Source: Own-Computation*

*Current State of Technological Infrastructure and ICT Access*

As mentioned before, Lesotho must be able to deliver certain conditions to be able to achieve the implementation of an effective ICT integration plan in the country. One of them, and the most basic one is a full coverage of electricity in the country. This means an investment in the electricity network in the country. As electricity and internet network and regional topics because of the geographical challenges, in this section, we will use the Southern African region and Zimbabwe will be kept too as comparison country.

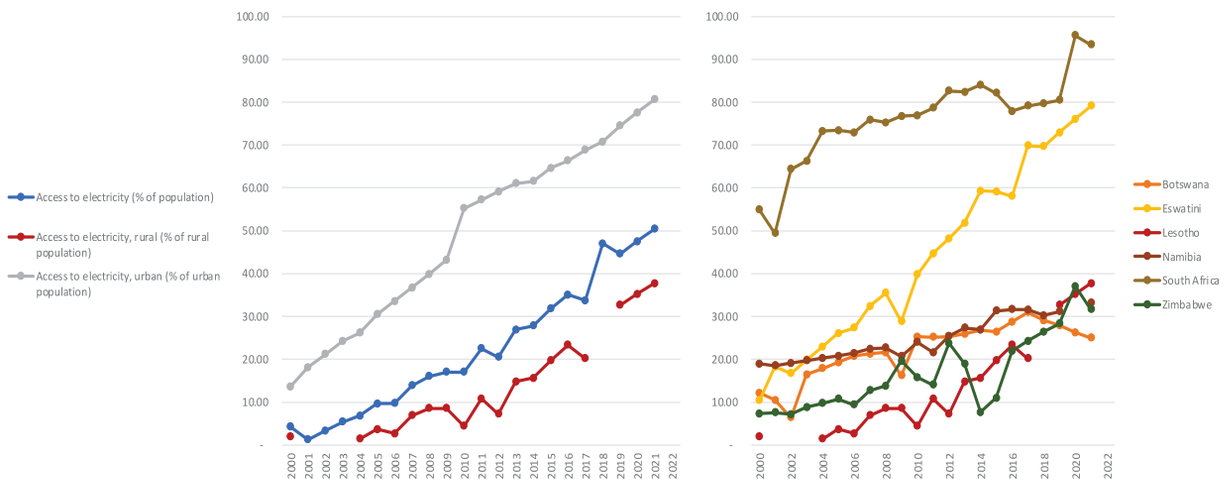



**Figure 2.2: Evolution of the electricity access in urban and rural areas (as % of the total population) and evolution of electricity access in the region and Zimbabwe, 2000-2021**
*Source: World Bank Data. Own elaboration*

Together with the development of accessibility to electricity, Lesotho has work also on increasing the coverage of 3G and 4G. The first figure, from left to right, in Figure 2.2, is the percentage of the total population using internet in the country. Lesotho has in the region the lowest percentage of population using internet (61.1% regional average vs. 48% Lesotho's average). However, compared with a country with similar HDI, the percentage is still higher (48% vs. 34.8%). However, the challenge of network coverage (% of total population with at least 3G coverage) has been addressed properly, as Lesotho is around the regional coverage with a 96.2% regional average and a 95% of country coverage. In comparison to Zimbabwe, which has a coverage of 84.3%. However, as technology evolves, looking into the coverage of the percentage of total population with at least 4G, the development of coverage of the technology, does no fall far behind, as the coverage for Lesotho is only 10 points lower, but still being around the region average (86.8% region vs. 85% Lesotho). Again, the comparison to Zimbabwe, makes in this specific technology generates a great gap between the two countries, as Lesotho is 45 points higher in coverage than Zimbabwe, with 40.1% coverage. (See Figure 2.1).

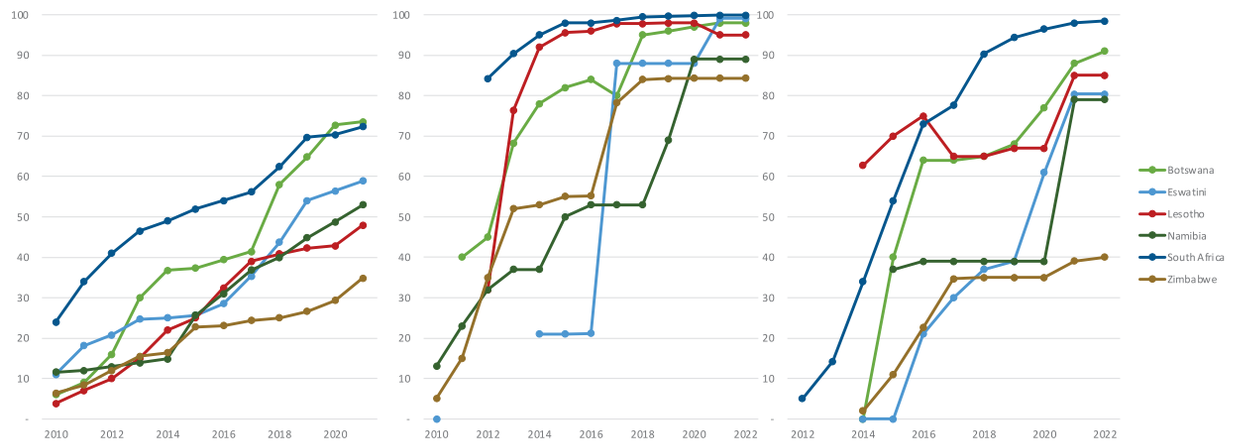



**Figure 2.3: Internet usage and coverage, in Southern Africa and Zimbabwe, 2010-2022. Source: ITU Own elaboration**

*Technology and Poverty and Inequality Reduction*

Technological advancements can revolutionize key sectors like agriculture, healthcare, and education in Lesotho. ICT tools can empower farmers with vital information on weather patterns and market prices, boosting productivity and income, especially in rural areas. Improved access to electricity and affordable internet and devices can enhance healthcare through telemedicine, bridging geographical gaps and improving health outcomes, particularly in remote mountainous regions. Similarly, ICT can facilitate e-learning platforms, benefiting students in urban and rural settings alike. Furthermore, mobile banking and digital financial services can promote financial inclusion, empowering individuals, including those in rural areas, to manage their finances efficiently. These advancements not only improve sectors like health and education but also foster entrepreneurship and job creation, particularly in the technology sector. Lesotho must strike a balance between attracting investors for new technologies and supporting national entrepreneurs. Programs like the Health Technologies and Innovations (HTI) Programme offer support for developing countries to improve access to health technologies and implement national public health action plans, which can propel Lesotho toward much-needed development.

### 2.2.2 Lesotho in the Future: Technology, Economic Growth and Human Development

The relationship between technological change and economic growth has long intrigued economists, notably exemplified by Robert Solow's pivotal 1956 paper. Initially, the "Solow

model" depicted technological progress as an exogenous force, impervious to policy influence. However, this assumption faced critique due to its limited policy implications. By the 1990s, discourse pivoted towards endogenous technological change theory, championed by Paul Romer, which recognized the active role of economic factors in shaping technology. This dynamic interplay underscores the imperative for policy interventions to foster innovation, research, and development.

Human capital, represented by education and health, emerges as pivotal for economic growth and technological adaptation. Gary Becker's seminal work equated investments in education with capital investments, positing that they yield returns in enhanced productivity and earnings. Integrating human capital into economic models, as advocated by Lucas, Romer, and Weil, illuminates its role in fostering innovation and entrepreneurship. While human capital and economic growth are inherently intertwined, they also exert profound influence on human development, albeit through different conceptual lenses, underscoring education and health as intrinsic values beyond mere economic assets.

Historically, technological advancements have propelled human development, evidenced by breakthroughs like the Green Revolution and widespread vaccination campaigns. However, concerns loom large regarding the ecological, health, and socio-economic impacts of new technologies, ranging from genetically modified organisms to digital surveillance. The onset of the "Second Age of the Machine," characterized by artificial intelligence (AI), automation, and big data, heralds unprecedented transformations across sectors, accompanied by ethical and distributive challenges.

Techno-optimists herald a utopian future propelled by technological progress, yet often overlook the risks and inequalities exacerbated by unregulated technological change. Job displacement, AI biases, privacy infringements, and environmental sustainability issues underscore the complexities of navigating the Second Age of the Machine. Skill-biased technological change exacerbates societal inequalities, widening the gap between digitally skilled and unskilled workers, thereby hindering economic mobility and human development. The evolving landscape of technological change demands nuanced policy responses that address both the potential benefits and pitfalls. Policymakers must balance fostering innovation and economic growth with safeguarding against adverse consequences, prioritizing investments in education, research, and infrastructure to ensure inclusive development in the era of rapid technological advancement.

## 2.3 NEW TECHNOLOGIES, EDUCATION AND HUMAN DEVELOPMENT

### 2.3.1 Challenges and Opportunities in Adopting New Technologies

Lesotho's unique position as a developing country presents opportunities for adopting new technologies, particularly in information and communication technologies (ICTs). Concepts like technological "lock-in" (Foxon, 2002) and leapfrogging (Fong, 2009; Steinmueller, 2001) elucidate the advantages of Lesotho's status quo. Unlike countries locked into specific technologies, Lesotho can transition to new technologies more swiftly, especially in ICT, without significant barriers. Leapfrogging allows Lesotho to bypass the developmental stages of older technologies and directly adopt advanced ones. By focusing on expanding network coverage and internet accessibility, Lesotho can transform its economy from extraction-based to information-driven (Goldemberg, 2011). However, this transition requires collaborative efforts from various institutions, organizations, and the private sector. A coordinated "big push" is necessary to address the country's challenges and achieve structural transformation in key sectors like ICT, education, health, and infrastructure. This collective investment can be sourced from development institutions, international organizations, private investors, and banks to drive Lesotho's development forward (Rosenstein-Rodan, 1957).

Lesotho stands at a critical juncture in its developmental trajectory, poised to leverage ICT as a catalyst for economic growth and social progress. Embracing the concept of an "entrepreneurial state" entails active government involvement in fostering innovation and creating an enabling environment for businesses to thrive (Mazzucato, 2011). This approach emphasizes the importance of public-private partnerships, where the government plays a pivotal role in driving technological advancement and addressing societal challenges. To realize this vision, the Basotho government must prioritize strategic investments in research, development, and innovation. Allocating resources to fund universities, research institutions, and innovation hubs is crucial to cultivate a culture of innovation and entrepreneurship. Collaboration between the government, private sector, academia, and other stakeholders amplifies resources and expertise, driving innovation forward (M. Mazzucato, 2011). Moreover, fostering transparency in decision-making processes and holding entities accountable enhances credibility and trust in collaborative efforts.

However, Lesotho's pursuit of innovation must navigate challenges related to governance, corruption, and political stability, which significantly influence foreign direct investment (FDI) flows (Asiedu, 2006; Ojode and Ofori-Brobbey, 2006; Moustafa, 2021). Corruption, in particular,

poses a significant barrier to FDI, undermining transparency and investor confidence. Addressing governance issues and implementing international conventions, such as the OECD Convention on Combating Bribery of Foreign Public Officials, can improve Lesotho's investment attractiveness (Ayadi et al., 2014). Beyond political and economic factors, Lesotho's investment climate must also consider nonpolitical determinants of FDI, such as the availability of raw materials and the rule of law. FDI can potentially enhance governance, suggesting a symbiotic relationship between investment and institutional quality (Lee and Lio, 2016). By strengthening governance structures and upholding the rule of law, Lesotho can create an environment conducive to sustainable investment and economic growth.

Strategic investment planning is essential to capitalize on Lesotho's developmental potential. Organizing investment waves focused on critical sectors such as health, education, ICT, and infrastructure lays the foundation for long-term economic development (Asiedu, 2002 & 2004). The government's commitment to infrastructure development, particularly in ICT and roads, enhances connectivity and access to essential services, fostering economic inclusivity and opportunity. Investment in research and development (R&D) emerges as a linchpin for innovation and economic diversification. Targeting key sectors like technology, healthcare, and renewable energy stimulates innovation-driven growth and human development (Nair et al., 2020). However, effective implementation of R&D initiatives requires careful evaluation and monitoring to ensure optimal outcomes.

A conducive legal and regulatory framework is indispensable in promoting innovation and protecting intellectual property rights. Tax incentives, coupled with robust enforcement mechanisms, encourage innovation-driven entrepreneurship and business growth (M. Mazzucato, 2011). Additionally, investments in STEM education programs nurture a skilled workforce capable of driving innovation across various sectors, laying the groundwork for sustained economic development. Lesotho's unique topography presents both challenges and opportunities for infrastructure development. While the mountainous terrain poses logistical challenges, strategic investments in road networks and ICT infrastructure are essential for enhancing connectivity and fostering economic development (National Development Plan). By prioritizing infrastructure development and strategic investments, Lesotho can unlock its developmental potential and pave the way for a prosperous future.

### 2.3.2 Education for ICT Adoption in Schools and STEM Education

**In particular** reforming the education sector involves two critical components: implementing STEM-based education and integrating ICT across all levels of schooling. Barakabitze et al. (2019) highlighted existing ICT initiatives in sub-Saharan Africa and identified challenges and Leveraging ICT in education can enhance equity, expand access to learning resources, and facilitate methodologies for ICT adoption in schools, home learning programs, especially in remote areas. Additionally, STEM education can be enriched through ICT, providing educators with tools to enhance learning experiences and expose students to cutting-edge advancements.

**Also** developing new markets and fostering a skilled labor force, particularly in ICT, can mitigate youth unemployment. Studies by Metu et al. (2021) and Ogbonna et al. (2023) demonstrate a correlation between ICT development and reduced youth unemployment in sub-Saharan Africa. Moreover, education enhances the impact of ICT on youth employment outcomes. Factors such as physical capital accumulation, lower corruption levels, and economic growth also play crucial roles in reducing youth unemployment.

### 2.3.3 Education and Human Capital: Cornerstones for Progress

The UNDP Country Programme Document for Lesotho highlights persistent challenges including poverty, unemployment, and inequalities, which have impacted literacy rates (UNDP, 2018). Lesotho's vulnerability to climate change and environmental degradation is exacerbated by heavy reliance on natural resources. The Inequality-Adjusted Human Development Index (IHDI) stresses the need to empower individuals and communities (UNDP, 2010). The Human Development Report (HDR2020) underscores the necessity of addressing unsustainability collectively (UNDP, 2020, p.21/22). Aligned with UNDP's strategic plan, leveraging digitalization and innovation can foster inclusive growth (UNDP, 2021, 2). Stakeholders emphasized investing in health, education, and skills development during the UNDP stakeholder meeting (GoL, 2018, 107). Lesotho's Second National Strategic Development Plan identifies cultural practices hindering human development, stressing curriculum relevance and institutional responsiveness (MoET, 2016). Examining higher education in Lesotho involves assessing access barriers and societal impact. Government initiatives like the Free Primary Education Programme have improved enrolment rates and gender parity (Ministry of Education and Training, 2008; Bureau of Statistics, 2019).

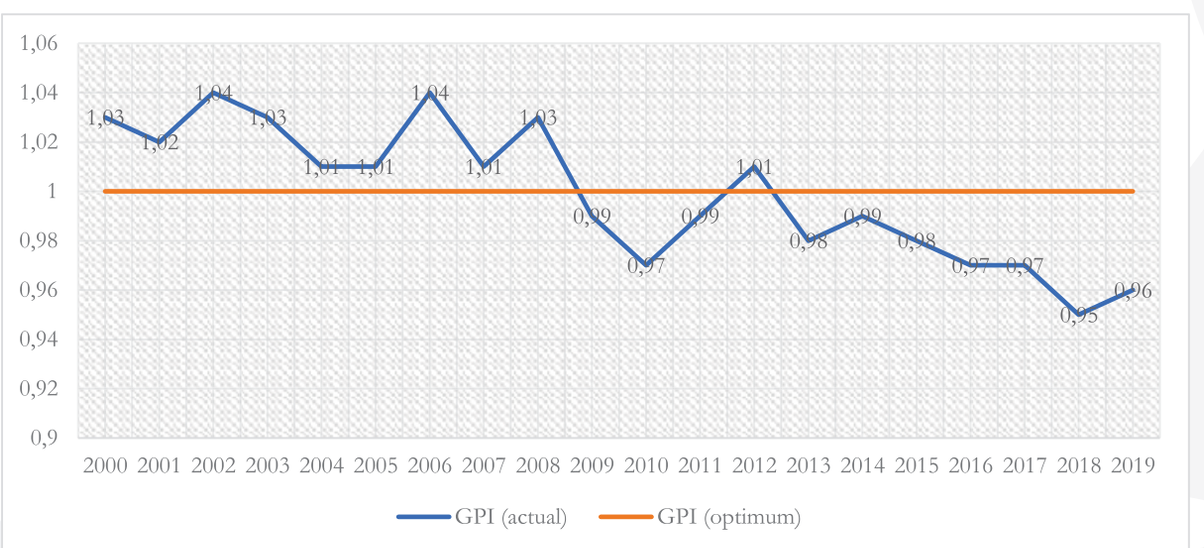



*Figure 2.4: Gross Enrolment GPI 2000 – 2019*
*Source: Bureau of Statistics (2019) 2019 Education Statistics Report.*

It is important to indicate that the Net Enrolment Gender Parity Index reached the optimum level of balance beginning in 2017 (Bureau of Statistics, 2019), indicating that the reversal of the GPI was partly due to overaged boys in the system. In addition, the Government of Lesotho has communicated initiatives to reduce internal barriers by discouraging repetitions (Phosisi, 2019), removing some high-stakes examinations such as the primary school-leaving examination and the Junior Certificate examinations with the result that repetition rates notably reduced in 2017 (Bureau of Statistics, 2018).

The FPE programme has notably improved access to primary education particularly but with some indications that the quality of grade attainment of students has declined post-FPE (Moshoeshoe, 2019). The Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ) report based on the performance of young students in Grade 3 and Grade 6 across the region has indicated that an increasing number of Basotho students are acquiring 'minimum knowledge' in reading and numeracy (Morris, 2021). Unfortunately, Basotho students are also found to be unable to engage in problem-solving and abstract thinking mathematics tasks at all (Maema and Mohale, 2017). Therefore, there are indications that while access has improved and some efficiency of basic education might have also been positively affected by policy initiatives, the quality of educational outcomes might have deteriorated, possibly affecting the entire schooling system.

The enrolment patterns are derived from the Higher Education Management Information System (HEMIS) available through the Council on Higher Education reporting system. After a significant growth in 2010, the reported enrolment patterns began to decline somewhat before recovering slightly in 2017.

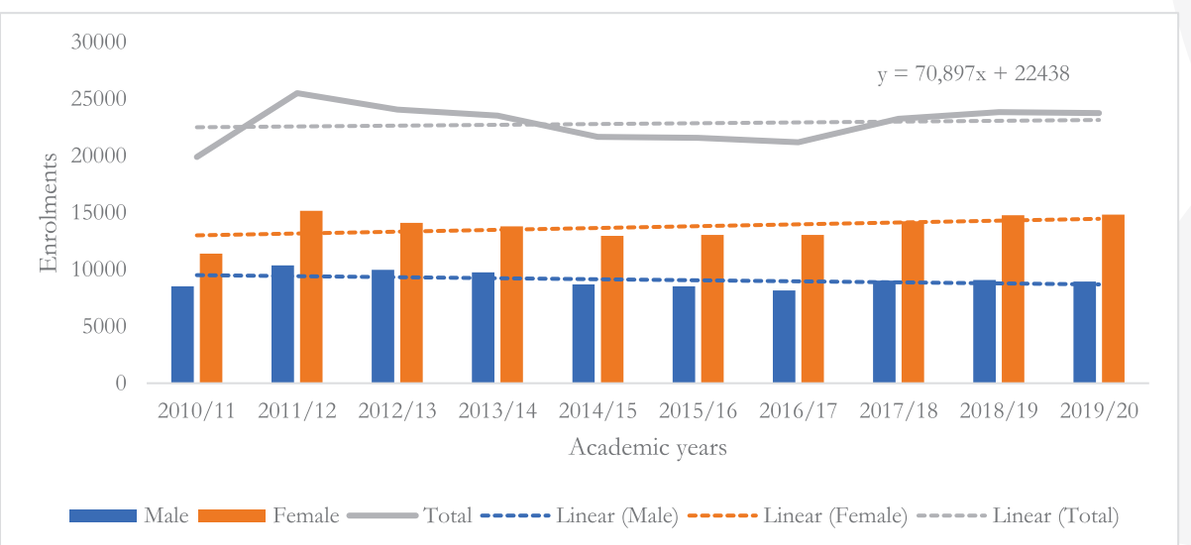
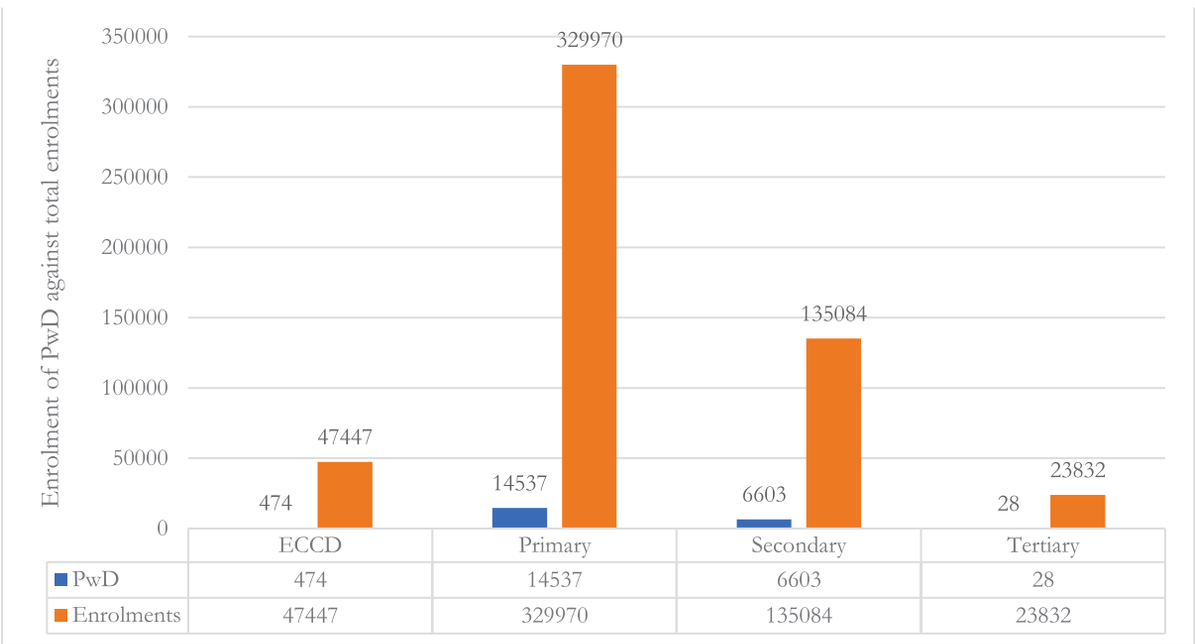



**Figure 2.5: Lesotho HE Enrolment Trends 2010 – 2019**
*Source: Council on Higher Education Higher Education Management Information System.*

Disaggregated data by gender reveals a decline in male enrolments, leading to an increase in the gender parity index from 1.3 to 1.7 between 2010 and 2019. Despite equitable rates in primary education (1), gender disparity favors girls in secondary (1.3) and even more so in tertiary education (1.6). Lesotho's low Gross Enrolment Rates (GER) at the secondary level (62.7) indicate boys' limited access rather than girls' accessibility. Despite this, Lesotho ranks 84th out of 146 countries in the Global Gender Gap Index, with low women's representation in managerial and parliamentary positions (Ministry of Social Development, 2018).

Women's high participation rates in education contrast with poor outcomes, especially in STEM subjects, impacting their higher education involvement. Cultural norms and education policies contribute to gendered performance disparities. Lesotho's disability population, around 4%, is notably lower than the global estimate of 16%, possibly due to identification challenges. However, the proportion of children with disabilities enrolled in primary and secondary schools aligns with the general population statistics at 4.4% and 4.9%, respectively (BoS, 2019; Ministry of Social Development, 2019)




| | ECCD | Primary | Secondary | Tertiary |
|---|---|---|---|---|
| PwD | 474 | 14537 | 6603 | 28 |
| Enrolments | 47447 | 329970 | 135084 | 23832 |

**Figure 2.6: Learners with disabilities across formal education programmes, 2019**
*Source: Bureau of Statistics Education Statistics Report, 2019.*

It is at both ECCD and Tertiary level that people with disability are under-represented where the proportion is 1.0% and 0.1%, respectively. The significance of the low enrolments at ECCD should be considered alongside the findings that children who do not attend ECCD or Pre-Primary education are unlikely to progress and attain the same competencies as those who attended ECCD. Therefore, it is likely that children with disabilities are not able to fulfil their academic potential in

school and it is for that reason that they are so under-represented in tertiary institutions. A case of the biggest higher education institution that holds the largest share within the academic practice in Lesotho makes for interesting enrolment patterns as illustrated below.

Disaggregating higher education data reveals concerning patterns in quality and equity, particularly within STEM fields, exposing systemic issues inherited from the secondary school system. According to the Council on Higher Education (2020), Lesotho's gender parity index stands at 1.6, a figure mirroring Botswana's (Statistics Botswana, 2021). While Botswana reports recent strides in female enrolments in technical fields (Statistics Botswana, 2021), Lesotho's participation in STEM areas such as ICT, Nursing, Science, Agriculture, Engineering, and Health remains alarmingly low. This situation underscores the need for concerted efforts to address disparities and enhance opportunities for diverse participation in higher education.

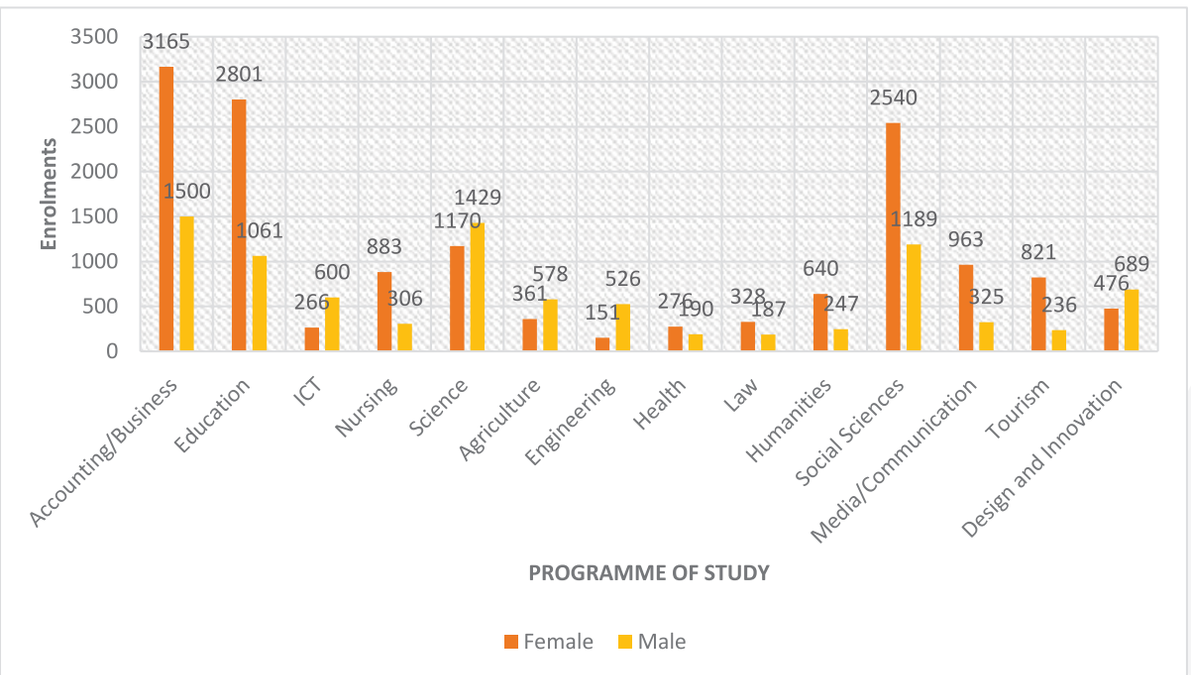



**Figure 2.7: 2019 HE Enrolments by Gender and Field**
*Source: Council on Higher Education Higher Education Management Information System*

The enrolment trends in STEM areas, apart from nursing, highlight significantly low participation among female students, with an overall gender parity index (GPI) favouring females reducing to 0.62 in STEM fields. Botswana exhibits notable progress in female enrolments in technical fields, with a higher inbound mobility rate of 2.1% compared to Lesotho's 0.4%. Lesotho's public institutions face substantial financial challenges, reporting financing gaps of up to 77.6% in 2018 (Council on Higher Education, 2020). STEM fields, crucial for the knowledge economy and future job markets, witness low enrolments and female under-representation, demanding targeted

recruitment strategies. Past initiatives such as the Mature Age Entrance and LESPEC widened access, yet they were not fully integrated into mainstream recruitment, limiting their impact. Improving recruitment strategies is crucial to enhancing diversity and addressing high dropout rates, particularly in STEM fields, where dropout rates at the public Polytechnic exceed the national average by almost tenfold, at 26.9% compared to 32.7% (Council on Higher Education, 2019).

### 2.3.4 Relevance and Responsiveness Initiatives in Lesotho's Higher Education

Amidst external pressures transforming academic institutions, challenges such as declining resources hinder rapid change in Lesotho's higher education system (Sunday Times, 2019). While opinions differ on public institutions' overreliance on subvention, Lesotho lags behind other countries in solid investments (Tlali & Hapazari, undated). Initiatives aiming to redefine academic institutions' roles have surfaced, notably with the National University of Lesotho (NUL) witnessing growth in postgraduate programs from 5% to 22% between 2015 and 2019 (Council on Higher Education, 2015; 2019). However, the implementation of niche programs, like the Master of Science in Sustainable Energy, faces challenges due to resource requirements and accreditation fees (Council on Higher Education, 2019). The Tuning Africa initiative and Commonwealth of Learning support capacity-building for quality assurance and open and distance learning, highlighting efforts towards curriculum reform and employability guidelines (CoL, 2019a; 2019b).

UNDP's Innovation Hub and Samsung's partnership with NUL demonstrate external collaborations enhancing technological skills (UNDP Symposium, 2010). Institutional initiatives since 2010, spurred by projects like the Nursing Education Partnership Initiative, have aimed to transition towards competency-based curricula and enhance teaching methods (Mokhethi et al., 2020). However, concerns persist regarding skills gaps, qualifications mismatch, and limited professional development programs (Mokhethi et al., 2020). The public funding model poses a key constraint, with evidence showing a decline in support for public academic institutions despite higher government spending on education (World Bank, 2019; Pillay, 2008). Despite these challenges, concerted efforts are being made to navigate the complexities and improve Lesotho's higher education landscape.

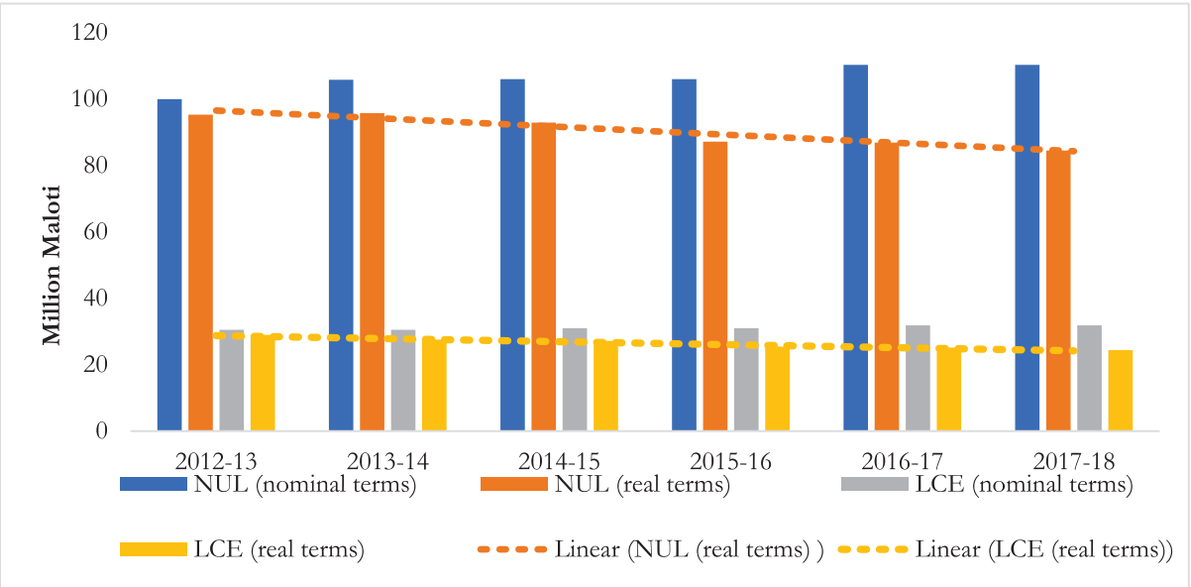



**Figure 2.8: Government subvention to the three biggest higher education institutions 2012/13 – 2017/18**

*Source: Ministry of Finance and Ministry of Development Planning.*

Funding for higher education in Lesotho is not only declining but is primarily allocated to student bursaries (World Bank, 2019). However, there are positive strides with collaborations with international partners like Samsung and development partners such as UNDP, focusing on enhancing youth entrepreneurship and innovation incubation. These initiatives, alongside internal efforts to review curricula and integrate entrepreneurial skills, aim to address national development needs but require sustained support through a refined national funding mechanism.

### 2.3.5 Human Development at Centre – Leave No One Behind

In the Human Development approach, individuals are both recipients and agents of development. To truly understand progress and challenges, voices from marginalized groups like people with disabilities, ethnic minorities, and women in STEM need amplification. Insights from diverse perspectives shed light on societal structures and individual agency. Despite strides in basic education, Lesotho faces modest human development, compounded by conflicts, climate change, and events like COVID-19. Higher education offers a crucial avenue to foster critical thinking, address crises, and promote sustainable energy solutions.

## Gender perspectives

| *Box 2 Voices of women professor with STEM-phobia* |
| --- |
| While I was coping with primary schooling in general, my dislike for and fear of mathematics occurred during the transition from primary school arithmetic to secondary school algebra – I could not understand this phenomenon of *x* and *y*. This was compounded by my secondary maths teacher who simply mystified the subject particularly the topic of trigonometry where there were a series of formulas that the teacher could not explain and simply presented as rules. Kannete tichere eaka ea maths one asa mphihlele. I believe I would have struggled with the teaching of mathematics if I were to become a primary teacher and would have to teach mathematics as well as all the other subjects. I am sure that's the reason most girls develop a phobia for mathematics – the fact that the majority of primary teachers, who are female, are not serving as role models in mathematics. |

Teachers play a pivotal role in shaping students' attitudes and confidence in subjects like mathematics. The professor's aversion to math, stemming from inadequate teaching during the transition from arithmetic to algebra, highlights the significant impact of educators on human development. In Lesotho, where the majority of teachers are female, negative attitudes toward math can hinder gender equity efforts. Conversely, supportive teacher practices can foster a culture of scientific inquiry among students.

| *Box 3 Voices of STEM women experts from a rural context* |
| --- |
| I honestly did not realise that I was inclined towards a STEM career until late into my secondary schooling. All I was aware of during primary was that I was able to cope and even compete academically, without being outstanding, in a primary school environment that both supported and encouraged hard work. That foundation built in a very rural school served me well into a secondary school where most students from urban backgrounds could speak fluently but write not as well as I could. In addition, the school had facilities for practical science experiments and a culture of hard work driven by a teacher who encouraged us all to work hard and gave us lots of assessment tasks, and I don't necessarily think that was because she was a female teacher nor because I was a female student. It was at that time that I started developing a curiosity for science, even stealing pH strips from the school lab to test the acidity of some home items such as vinegar, but also participating competitively in extra-curricular science activities such as the Science Club. But I also read widely on the subject and took on additional activities such as enrolling in an additional ICT after school class. |

Small initiatives like School Science Clubs and the Lesotho Science Pre-Entry Course (LESPEC) have empowered disadvantaged students, laying a strong scientific foundation. The STEAM conference aims for future innovation, but academic institutions must amplify these efforts. This involves developing a robust science curriculum for primary teachers and fostering effective teaching practices. Additionally, combating sexism in STEM is essential for women's equitable advancement in the field.

### People with disabilities

As already indicated in the presentation of trends, people with disabilities are seriously underrepresented, particularly in higher education where lives are transformed. The key informants interviewed described how to access education many had to leave their homes at a very young age, depriving themselves of much needed parental and community support. This is because there are very limited schools that accommodate children with disabilities, and as a result, they often do not have much choice in terms of the selection of schools to attend. Even in those schools, the learners struggled to get access to proper resources such as assistive devices and competent support in the form of trained teachers as illustrated in the personal story below.

***Box 4: Voices of graduates with disabilities***

I used braille, teachers did not know braille and as a result, transcribers are hired to translate braille into a printed format so that teachers could be able to read whatever I had written. There used to be a delay in getting my feedback since after writing my script had to go through different steps, knowing that sometimes if the hired transcriber is not so sure of what I have written he/she would write anything that might be close to what I have written. As a result, I would be marked wrongly based on something that I did not write, the typical example is during the time I was in class six, I failed a Mathematical test because the transcriber did not transcribe all the scripts and they had to be taken back to him, later I received corrected marks. Sometimes my scripts were delayed and even misplaced, and I would be punished for getting answers wrong like other peers, yet my script was not marked because the scripts were not back from the transcriber and found later that I got all the answers correct.

## 2.4 HEALTH AS A PILLAR OF HUMAN DEVELOPMENT

### 2.4.1 *Healthcare in Lesotho- Current Status and Major Health Challenges*

***HIV Incidence and Prevalence***

The prevalence of HIV infection among persons aged 15–49 years was 24.6% in 2014 (Schwitters et al. 2022). The incidence of new infections is 1.9 per 100 person-years of exposure, and low antiretroviral treatment (ART) coverage has been reported (Schwitters et al. 2022). The HIV adult prevalence rate is 20.9% (Schwitters et al. 2022; World Bank 2023). Nonetheless, HIV prevalence in Lesotho has been declining since 2015 as shown in Figure 2.9.

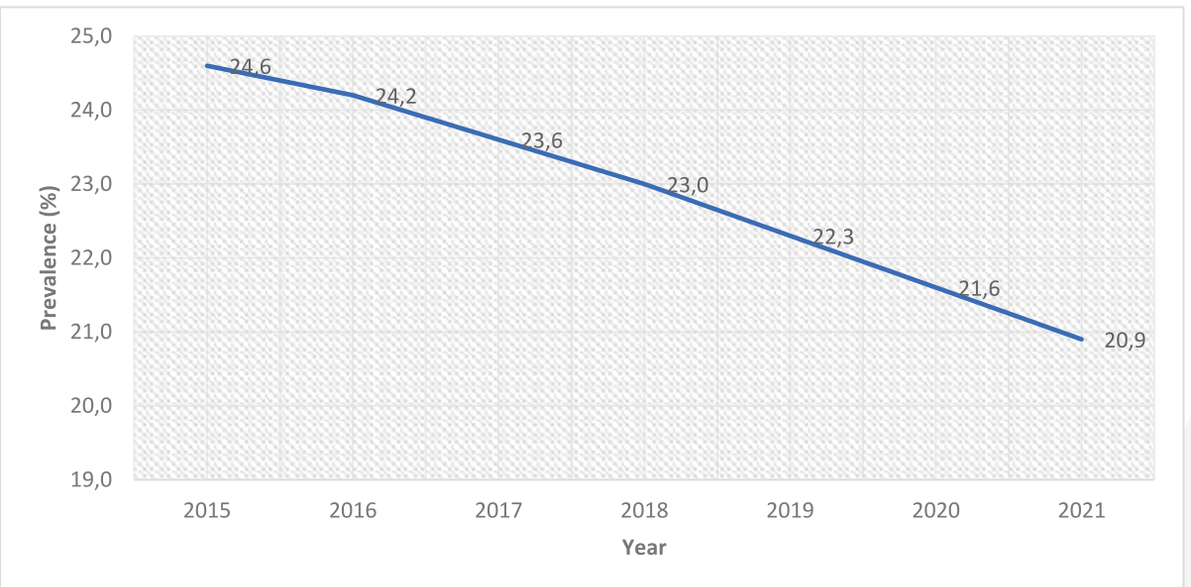



**Figure 2.9: HIV Prevalence in Lesotho of Population Aged 15-49 Years, 2015 – 2022**
*Source: World Bank Data.*

The government provides around one-third of the funding for its HIV response, relying mainly on international investments (UNAIDS 2021). Despite significant progress, there are still gaps in achieving the first 90 target of the 90-90-90 strategy, and targeted testing is needed for early diagnosis of individuals unaware of their HIV-positive status. The country has also made efforts to expand HIV self-testing, index testing, and partner notification services. Nevertheless, at least 10,000 new infections were observed from 2015 to 2023 as presented in Figure 2.10, widening the gap from the set target (Government of Lesotho 2018). Marginalized population groups, such as sex workers, are disproportionately affected, with around 64% of sex workers estimated to have

HIV (UNAIDS 2021). The high prevalence and incidence of HIV in Lesotho make it essential to intervene quickly, despite the challenges in controlling the epidemic. The government has been working on comprehensive strategies for providing integrated health services for HIV (Schwitters et al. 2022; Thin et al. 2019; UNAIDS 2021).

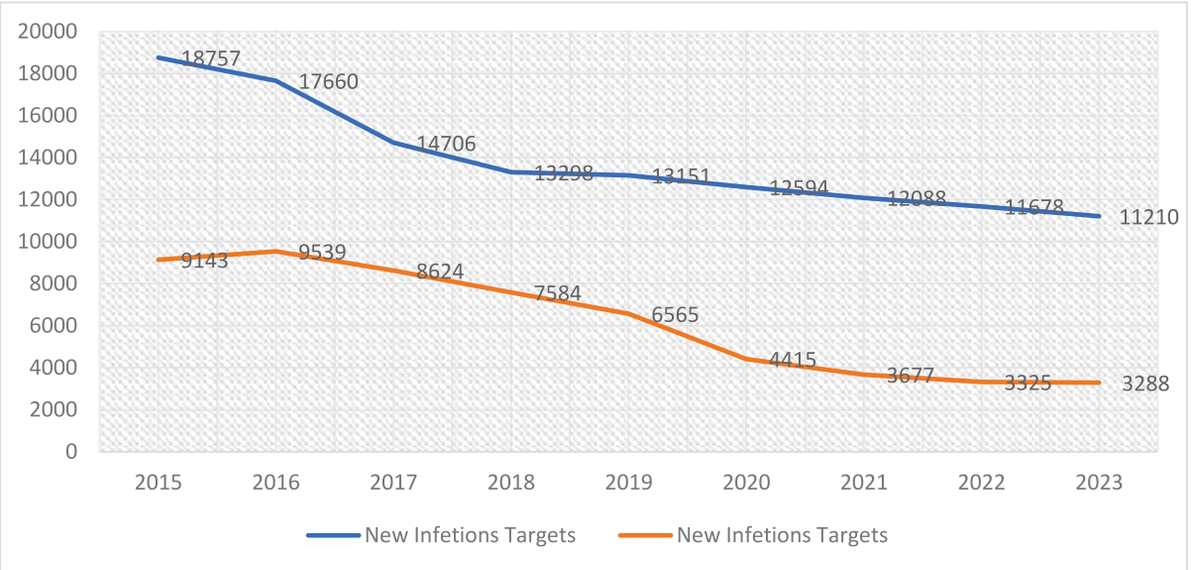



**Figure 2.10: Trends in New HIV Infections Against Fast Track Target, 2015-2023 (All Ages)**
*Source: National HIV & AIDS Strategic Plan 2018/19 – 2022/23.*

There is limited information available on the most common STIs in Lesotho. However, according to research, syphilis and chancroid are the dominant STIs in eastern and southern Africa, including Lesotho; both are ulcerative STIs that greatly increase the probability of HIV transmission (Population Reference Bureau 2007). Some studies also found that active syphilis infections among men who have sex with men (MSM) in parts of southern Africa, including Lesotho, have a prevalence of up to 5.3% (Stahlman et al. 2015).

***Tuberculosis***

The World Health Organisation set targets in the End TB Strategy, and these targets aim at reducing TB deaths by 90% and TB incidence rate by 80% by 2030. It can be noted that milestones towards 2020 of the strategy states 35% reduction in TB deaths and a 20% reduction in incidence rate between 2015 and 2020 in Table 2.4 (WHO 2020).

**Table 2.3: Targets for the Reduction of TB Disease Burden**

| Indicator | Milestones | | Targets | |
|---|---|---|---|---|
| | 2020 | 2025 | 2030 | 2035 |
| Percentage reduction in the absolute number of TB deaths per year (baseline 2015) | 35% | 75% | 90% | 95% |
| Percentage reduction in the TB incidence rate (new and relapse cases per 100000 population per year) (baseline 2015) | 20% | 50% | 80% | 90% |

*Source: Global Tuberculosis Report 2020.*

The incidence of tuberculosis (TB) in Lesotho has been a significant public health concern. The incidence of TB in Lesotho was 780 patients per 100,000 of the population in 2015, and it reduced to 661 in 2022 (World Bank 2023). The Global Burden of Disease Study 2015 also highlighted that Lesotho has one of the highest rates of TB incidence and TB-HIV co-infection in the world (Luba et al. 2019). Additionally, Lesotho has one of the highest TB incidence rates in the world, estimated at 654/100,000 population as indicated in Figure 2.11 (Andom et al. 2023; Matji et al. 2023). The prevalence of multidrug-resistant TB (MDR-TB) is also among the highest in sub-Saharan Africa (Andom et al. 2023). HIV is a major driver of the TB epidemic in Lesotho, as the adult HIV prevalence is 20.9% (World Bank 2023). The estimated TB detection rate in the country is only 51%, meaning that approximately half of TB patients are neither diagnosed nor treated (Andom et al. 2023). These sources indicate that TB incidence remains a critical issue in Lesotho.

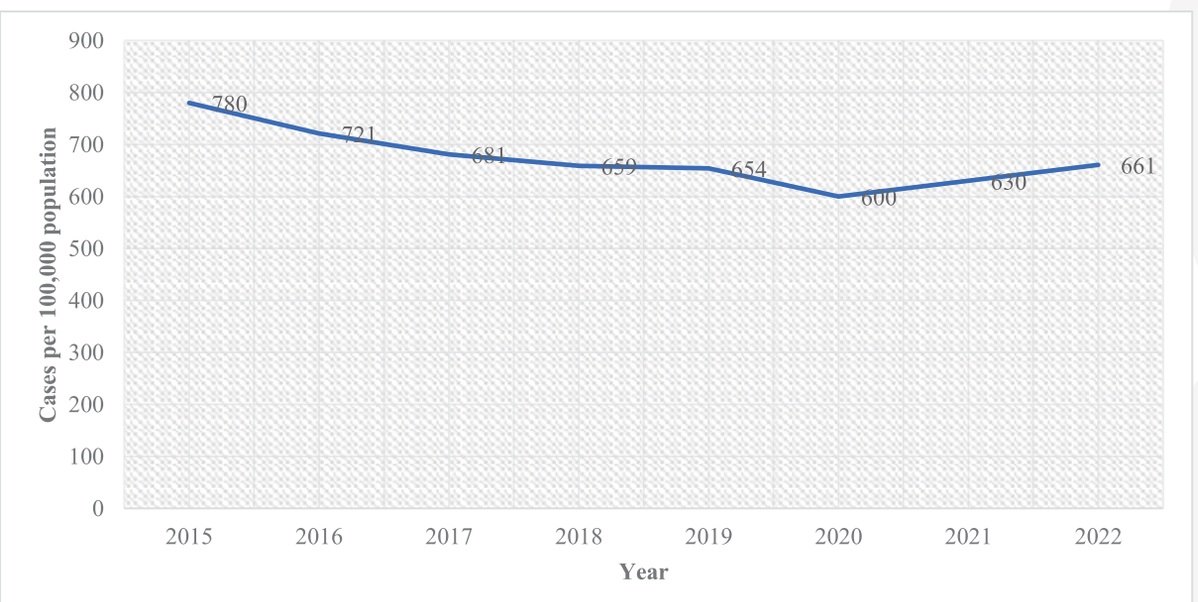



**Figure 2.11: Incidence of TB per 100,000 Population, from 2015 –2022**
***Source: World Bank Data 2022.***

According to a study on participatory surveillance of COVID-19 in Lesotho, the country initially relied on testing suspect cases in South Africa, where the infrastructure was overwhelmed, leading to a lack of testing in Lesotho (Greenleaf et al. 2021). This limitation in testing capacity may have affected the accuracy of COVID-19 surveillance in the country. Additionally, a report by the United Nations Development Programme highlights that Lesotho's fragile health system and socio-economic linkages with South Africa make it vulnerable to the impacts of COVID-19 (UNDP 2020). These factors may have further limited the country's ability to implement effective surveillance measures. However, a community-based COVID-19 response was implemented in Lesotho at the beginning of the pandemic, which provided screening and testing services to the community and an opportunity for direct surveillance (Klinkenberg et al. 2023). A study on influenza-like illness (ILI) surveillance in Lesotho also suggests that cell phone-based systems, such as LeCellPHIA, can provide near real-time data on disease incidence in the population (Francis et al. 2023). Overall, while there were limitations to the COVID-19 surveillance system in Lesotho, efforts were made to implement alternative methods to estimate disease incidence and provide community-based responses to the pandemic.

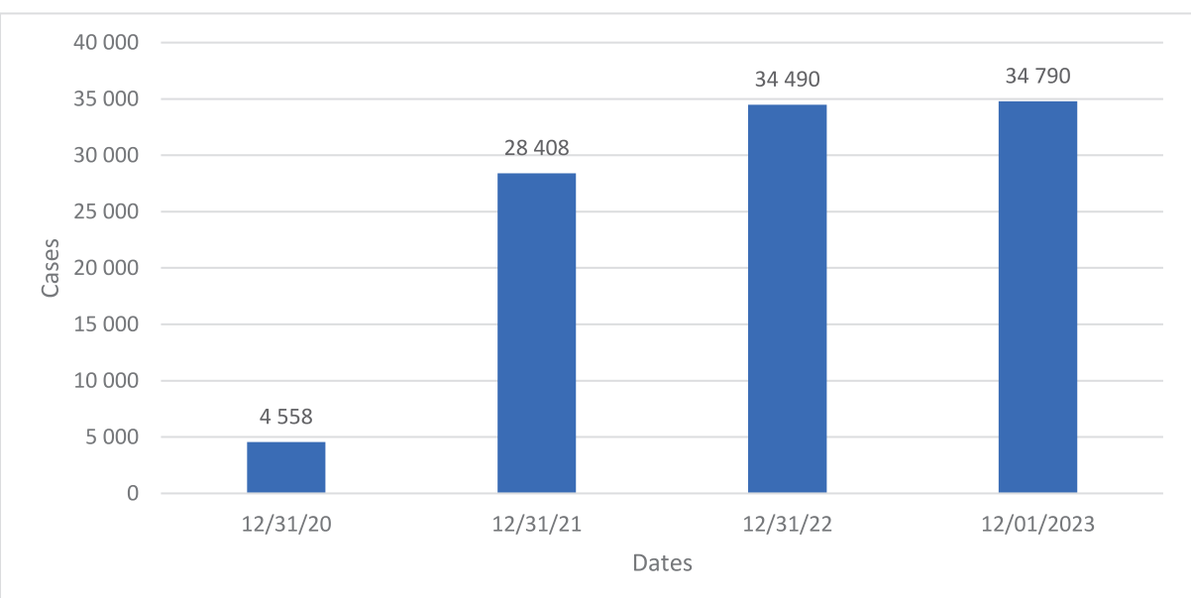



**Figure 2.12: COVID-19 Cases in Lesotho from 31st Dec 2020 – 1st Dece 2023**
*Source: World Life Expectancy 2023.*

It is important to consider the specific implications for the country's healthcare system, economy, and society. The assessment should address the effectiveness of testing and surveillance efforts, the challenges faced in implementing public health measures, and the overall resilience of the nation in responding to the pandemic. Additionally, the impact on vulnerable populations, such as the elderly and those with pre-existing health conditions, should be thoroughly evaluated. Understanding the unique context of Lesotho and the lessons learned from its Covid-19 assessment can contribute to global efforts in managing and mitigating the impact of the pandemic.

***Maternal Mortality***

The maternal mortality rate (MMR) decreased from 1024 deaths per 100,000 deaths in 2014 to 642 deaths per 100,000 deaths in 2021, as shown in Figure 2.13 below (Bureau of Statistics 2023; Ministry of Health and Social Welfare 2014). Some of the factors that have been identified contributing to this high MMR include delays in maternal care; namely delays in deciding to seek health care by the woman or her family, delays in reaching health care facility and delays in receiving care at the facility, sepsis, abortion complications, obstructed labour, pre-eclampsia, and haemorrhage (Nkosi 2016; Steele et al. 2019). Other literatures discovered that obstetric haemorrhage and hypertensive disorder contribute to the escalating mortality rates in Lesotho (Lebuso and De Wet- Billings 2022). Lesotho could improve its maternal mortality by removing user fees and strengthening its healthcare system (Steele et al. 2019). Despite some progress, Lesotho's maternal mortality ratio is still more than twice the global average.

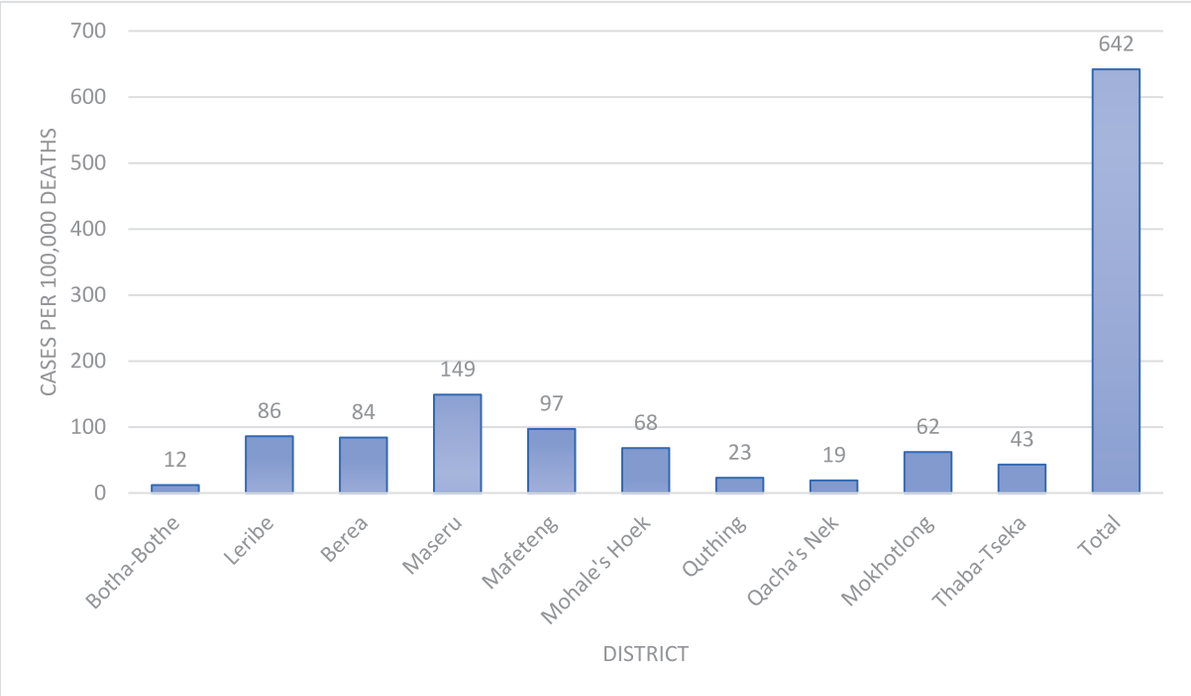



**Figure 2.13: Number of Reported Maternal Deaths by District, 2021 LDS**
*Source: 2021 Lesotho Demographic Survey.*

The figure 2.14 indicates maternal mortality prevalence by age group. The majority of females in the age groups 25 to 29 and 30 to 34 years experienced maternal mortality with the proportions of 46.8% and 27.6% respectively. A similar pattern is observed within the same age groups for women who died while pregnant with 48.5% and 27.5% accordingly. The highest maternal mortality was more prevalent among women aged 25 to 29 years, which was observed at 71.3%.

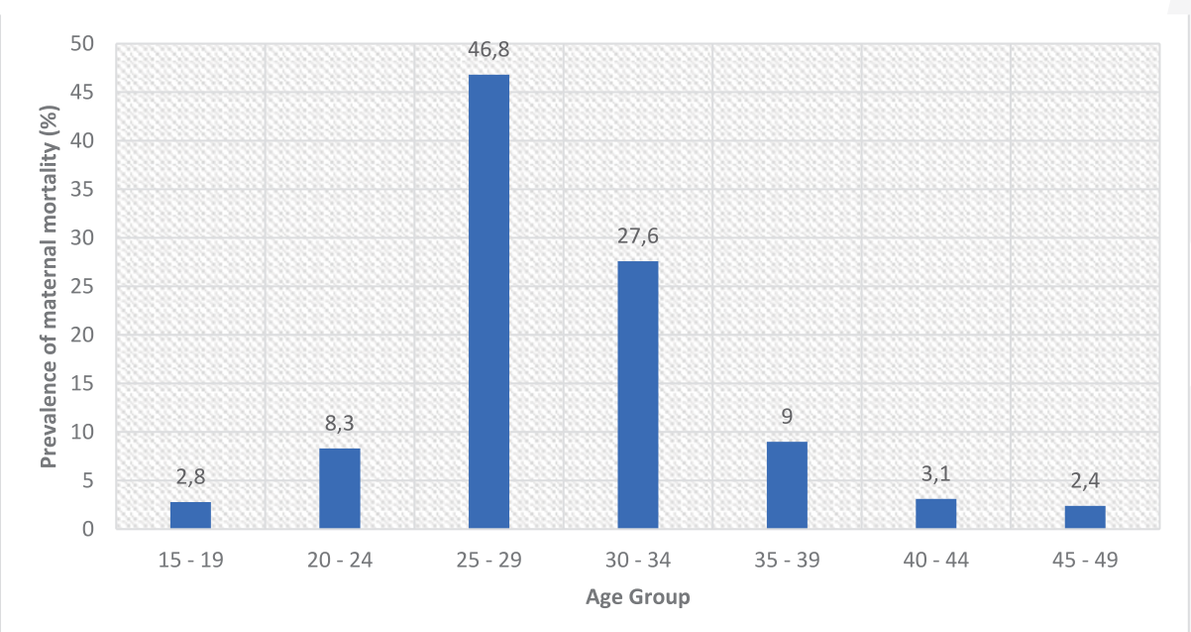



**Figure 2.14: Prevalence of Maternal Mortality by Age Group, 2021 LDS**
***Source: 2021 Lesotho Demographic Survey.***

***Healthy Average Life Expectancy (HALE)***

Since 2015, Lesotho's healthy life expectancy has fluctuated. According to the 2021 Lesotho Demographic Survey (LDS), life expectancy at birth improved from 50.1 years in 2001 to 61.6 years in 2021, with females consistently outliving males (Bureau of Statistics, 2023). However, in 2016, the healthy average life expectancy was 46.6 years, with women enjoying three more years of "full health" than men. By 2019, this declined to 44.2 years, with men leading by two years in good health (Knoema, 2023; WHO Regional Office for Africa, 2020). Factors like health expenditure, life expectancy improvements, and gender disparities play crucial roles. Lesotho's healthcare investment rose to $155,765,000 in 2019, contributing to life expectancy gains (Population Reference Bureau, 2019). Improved life expectancy trends may also reflect healthcare investment and gender equality efforts. Despite progress, gender disparities persist, highlighting the need for targeted interventions (Cao et al., 2020).

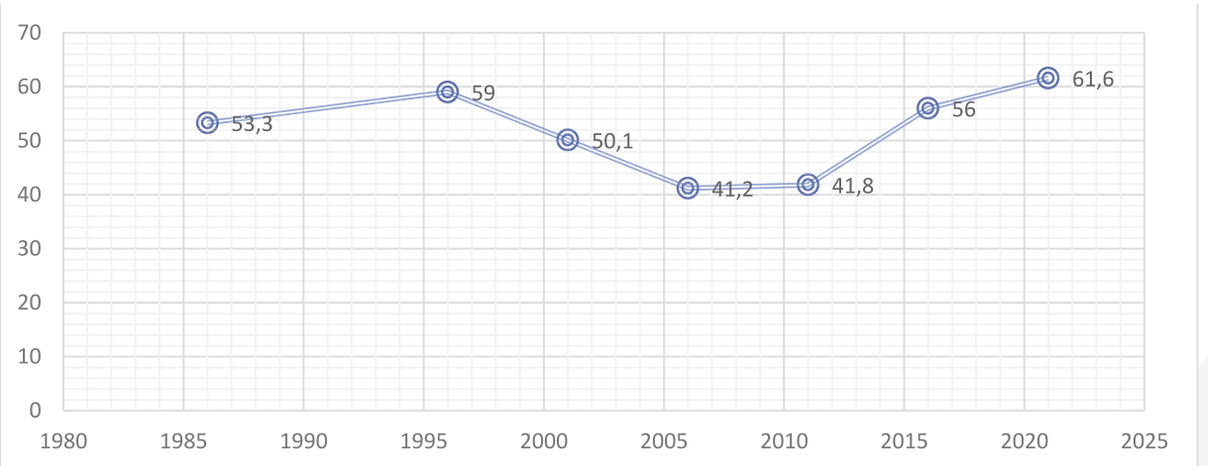



**Figure 2.15: Trends in Life Expectancy 1986-2016 Censuses and 2001-2021 LDS for both Sexes**

*Source: 2021 Lesotho Demographic Survey.*

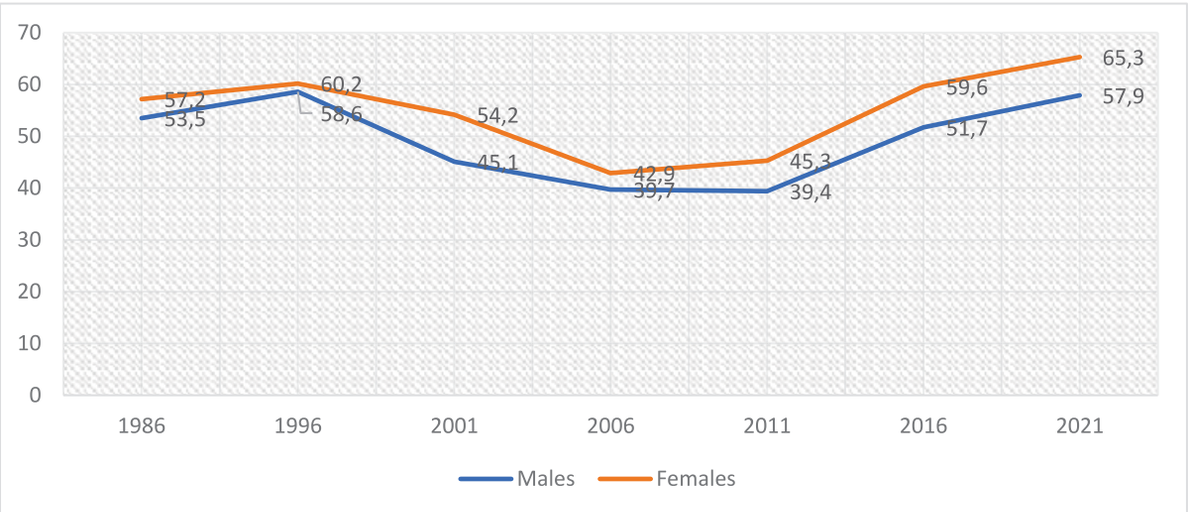



**Figure 2.16: Trends in Life Expectancy 1986-2016 Censuses and 2001-2021 LDS by Sex**
*Source: 2021 Lesotho Demographic Survey.*

In conclusion, the healthy life expectancy in Lesotho has seen improvements in recent years, influenced by factors such as health expenditure and life expectancy. However, there is still a gender gap in healthy life expectancy, and further efforts are needed to ensure that both men and women in Lesotho can enjoy a high quality of life for longer periods.

### 2.4.2 Integrating technology in health- digital innovations and their impact on public health

The integration of technology into Lesotho's healthcare system has brought about significant advancements, aiming to enhance healthcare delivery, data management, and accessibility to health services. This transformation is observed across various domains, each with its distinct impact and challenges.

***Exploring Indigenous Knowledge and Western Medicine in Lesotho's Health Care System***

The coexistence of indigenous healing practices and western medicine characterizes Lesotho's healthcare landscape, reflecting a blend of tradition and modernity. Efforts to integrate indigenous knowledge, such as herbal remedies, into mainstream healthcare services have been observed, acknowledging the cultural preferences of the local population. While traditional healers continue to serve as primary healthcare providers in underserved areas, initiatives to preserve and evaluate the effectiveness of indigenous practices are underway, aligning with national health policies.

### *Unlocking the Potential of Medical Technology and Innovation*

Advancements in medical technology have significantly impacted Lesotho's healthcare system, particularly in combating diseases like HIV/AIDS and improving maternal and child health outcomes. Medical technologies such as telemedicine, electronic health records, and remote monitoring have extended healthcare access to remote areas, facilitating efficient healthcare delivery and resource allocation. However, challenges such as infrastructure limitations and financial constraints hinder the widespread adoption and sustainability of these technologies, necessitating collaborative efforts and strategic planning.

*Box 5: Bophelo-Ka-Mesebetsi Application- Digital Platform to Record and Analyse Community Health Data in Lesotho.*

UNDP in partnership with the National University of Lesotho (NUL) and Econet Telecom Lesotho (ETL) through the Accelerator Lab, developed a digital platform called Bophelo-Ka-Mosebeletsi Application in 2021.
The application was mainly developed for Village Health Workers (VHWs), to map COVID-19 alerts at a community level to local health facilities.

The VHWs unit has been pivotal during the COVID-19 pandemic by executing awareness campaigns in communities, monitoring individuals at home quarantines and relating to COVID-19 suspects who have a history of international travel or symptoms to healthcare facilities in real-time. The system aimed to automate most of the processes by helping collate required data and facilitate reporting.

**Achievements:**

- Data was collected effectively using tablets while the system automatically formulated and submitted reports to authorities and healthcare facilities.
- The system saved VHWs' monetary resources which were usually incurred during travel and sometimes accommodation near healthcare facilities for those living far from health facilities.
- More time dedicated to VHWs activities was saved.

**Lessons Learned:**

- The platform has been expanded to become a de facto Community Health Information System, incorporating additional functionalities to process all community health activities and used by all units within Ministry of Health.
- The application brought several opportunities, including accelerating the implementation of the Ministry of Health's e-health strategy, which was developed in 2015.

The platform was also able to eradicate a digital gap in Lesotho's rural communities with access to the internet for ease of communication, access to information resources, access to use of mobile money for financial inclusion, and general relief from affected communities.

### *The Impact of Digital Healthcare*

The introduction of digital health tools has transformed Lesotho's health system, enhancing data management, healthcare delivery, and patient outcomes. Digital platforms and mobile health applications have facilitated remote consultations, health education, and real-time monitoring, bridging geographical barriers and empowering individuals to manage their health effectively. Despite notable progress, infrastructure limitations and disparities in digital literacy remain challenges, requiring continued investment and strategic planning.

### *Health Equity and Quality of Care*

Efforts to achieve optimal quality of care and health equity in Lesotho have been observed through initiatives like the National Health Reform. These interventions aim to improve access to healthcare services, enhance the quality of care, and achieve Universal Health Coverage. While progress has been made in increasing antenatal care, facility-based deliveries, and outpatient visits, challenges such as poor health outcomes and human resource crises persist, underscoring the need for sustained efforts and collaborative partnerships.

### *Policy Implications: Strengthening Healthcare Systems for Equitable Access*

The adoption of digital health technologies presents opportunities to strengthen Lesotho's healthcare system and improve health outcomes. Initiatives like health for HIV/TB treatment support and the National Health Reform demonstrate efforts to enhance healthcare delivery and achieve Universal Health Coverage. Collaboration between government, healthcare providers, and international organizations is crucial to overcoming challenges and leveraging digital innovations effectively. Emphasizing Indigenous data governance principles and considering local contexts are essential for the successful implementation of digital health solutions.

# CHAPTER 3

## PROMOTING AN ENABLING ENVIRONMENT FOR TECHNOLOGY AND INNOVATIONS IN LESOTHO

This chapter aims to provide an overview of the tactics and systems needed to create a favourable atmosphere for new inventions and technologies in Lesotho. Lesotho is facing an opportunity to transform itself into a technology powerhouse, promote economic growth and unleash a process of increased human development. It requires, however, a significant investment, long-term planning, and a people-centred approach to technological change. Because Lesotho doesn't have much outdated technology, it can skip ahead and adopt the latest information and communication tools much faster than other countries. The potential to leap-frog and adopt cutting edge processes and technologies can transform the challenges into opportunities for a rapid and effective technological transition.

Lesotho's transition from early industrialization and agriculture-based economy to a knowledge-based economy needs a "big-push". This means everyone comprehensive partnerships: the government, international agencies, and private sector. These partnerships will require to invest heavily in key areas like education, healthcare & nutrition, and physical infrastructure. The expectation is that the initial big push will create new markets, decent jobs, and a dynamic economy. For this, the government will play a vital role by actively investing in new ideas and inventions. By acting like an enterprising leader, Lesotho can drive innovation and make the economy grow and ignite human development.

The transition towards this entrepreneurial state will require a clear public vision to identify strategic sectors, take calculated risks, and promote research and development. Investment in universities and research institutions, transparency in governance, and accountability is key in this transformation. Moreover, attracting foreign direct investment (FDI) and leveraging ODA is crucial for this journey.

Given the complex nature of such a transition, long term planning and prioritization is needed. Initially, and given the state of human development indicators and the demographic transition in Lesotho, public and private investments could focus on areas like healthcare, STEM-focused education, ICT and network expansion, and road infrastructure. The second wave of investments

could target the development of key markets, particularly those based on ICT. This approach will ensure the developmental needs of the country are met while also creating an attractive environment for subsequent market development.

As indicated above, focusing on research and development is indispensable for the technological transition, economic growth, and human development. Allocating and leveraging funds for R&D in sectors like technology, healthcare, and renewable energy will foster innovation. Additionally, developing a legal and regulatory framework that encourages innovation, protects intellectual property rights, and facilitates business growth is paramount. In education, investing in STEM fields and integrating ICT into all levels of education will cultivate a skilled workforce, driving innovation across various sectors.

For this transition to succeed, it will need to be people-centred, especially given the challenges in human development still present in the country. Early childhood development programs, targeting healthcare and nutrition, will lay a strong foundation for future generations and for a work force with higher levels of human capital. Similarly, job creation strategies, especially for young people, are vital as the transition will need to be inclusive.

## 3.1 ESSENTIALS OF AN INNOVATION SYSTEM IN LESOTHO

Long-term global economic growth and increases in living standards and quality of life are largely dependent on innovation. Globally, new policy approaches have acknowledged the role of innovation as an engine of economic growth, bolstered by insights derived from scientific research and development. To fuel economic progress and improve people's lives, creative ideas, research, and advancements must be successfully translated into valuable products.

The importance of entrepreneurship, innovation, and research to Africa's economies has rarely been discussed in policy discourse in the past. The low degree of inventions and the lack of formal reporting and statistics have been blamed for this. Countries that undertook the initiative to develop policies and define the scope and operations of their innovation systems are realising socio-economic benefits. For instance, in 2014 nations such as Kenya, Nigeria, South Africa, Tunisia and Morocco acquired more than 10% of the GDP from innovation-led-sectors, primarily ICT[7]. It further indicated iHub, has become an internationally recognised location for innovators and attracts significant investment.

[7] Research and Innovation Policy Recommendation Report for Lesotho, 2022.

The global innovation landscape is undergoing drastic transformation at the same time as global challenges are becoming more complex, less predictable and require more urgent action. The COVID-19 pandemic is one example where challenges confronting global economies need robust and resilient research and innovation (R&I) systems to handle unexpected challenges. Without a well-defined policy framed to adapt to changing situations, the potential benefits of R&I are not completely realised. It is, therefore, necessary to have a policy that guides R&I efforts to where they are needed most[8]. The administration of Lesotho, therefore, needs to transition to an innovation-led and knowledge-based economy.

To expedite the innovation process, the government of Lesotho through the Department of Science and Technology developed the new Research and Innovation policy which consists of a series of strategies for activities to be undertaken by the government within the proposed timeframe of 10 years (2022-2032). The methods include the following: Establishment of a national Research and Innovation Agency, strengthening of tertiary education and workforce training programmes, prioritisation of investments in collaborative scientific research and development, improvement of inclusion and socioeconomic equality and equity in R&I, integration of indigenous knowledge systems and management of intellectual property (IP) protection, creation of a conducive business environment for innovation, strengthening access to R&I information and adoption of new and relevant emerging technologies.

***Establishment of a national Research and Innovation Agency***

Lesotho's research system is quite small (R&D expenditure ~0.05 % of GDP in 2015), and has no national mechanisms for guidance on research priorities and financing. The country further confronts a shortage of local incubators and accelerator programmes essential for a mature start-up ecosystem. However, in mature economies, start-ups are backed by applied research, and the innovative thinking of universities and research laboratories functioning as knowledge centres. The establishment of a semi-autonomous or independent organisation, council or agency that is specifically responsible for coordinating a framework of research and innovation is the mainstay of many economies around the world[9] and is also recommended for Lesotho, with unanimous support from the main stakeholders.

The national R&I Agency (RIA) will oversee the mobilisation of research resources, offer a framework for RIA advice, and manage the country's investments in R&I financing. It will report to Parliament through the Ministry responsible for Science, Technology, and Innovation (STI). In

[8] Organisation for Economic Cooperation and Development, 2021
[9] GTIPA, 2019

addition to assisting creative start-ups and MSMEs in Lesotho with developing their capacity for innovation and bringing their ideas to market, the RIA will support regional incubators and accelerator programmes at academic institutions, public labs, and national centres of excellence. This will be accomplished through connections to available business and R&D skills, financial aid, and consulting services. The objective is to boost the Lesotho economy's potential for expansion, investment, and job creation in addition to fostering the growth of new enterprises and entrepreneurs.

***Strengthening of tertiary education and workforce training programmes***

In order to achieve sustainable economic growth and development in Lesotho, quality and reasonably priced postsecondary education (HE and TVET) is a crucial component. The low efficacy and efficiency of public education investment, the mismatch in skills, and the lack of essential skills like management, engineering, and entrepreneurship are just a few of the major issues addressed in NSDP II. In order to provide high-quality education for everyone, the government is working to enhance workforce training programmes and industry collaborations in order to guarantee that postsecondary education meets the demands of society and the labour market. In order to accomplish all of these goals, the government must create institutional faculty-industry advisory boards to oversee the curriculum and appropriate titles of qualification on a regular basis to ensure they meet industry standards. Additionally, new or contemporary technology and engineering training programmes up to the post-graduate level must be integrated to align with the fourth industrial revolution. Finally, industrial attachments, internship programmes, or workplace-integrated learning programmes must be developed to impart relevant skills to graduates by making employability a key performance indicator for institutional quality assurance systems.

***Prioritisation of investments in collaborative scientific research and development***

In terms of the number of patent applications filed in relation to population size, the number of patent applications filed with partners from other nations, and the stature and standing of domestic research institutions, Lesotho ranks very low internationally in terms of its scientific outputs and innovation capabilities. Renewing government commitment and investments in technology and innovation programmes, including research and development (R&D) institutions and programmes, as well as increasing private sector and international engagements in the development, transfer, and adoption of pertinent technologies, are imperative if the potential outcomes and contribution of this sector are to be realised. Establishing national laboratories and

centres of excellence (CoEs) for research and development in priority areas, establishing annual seed funding for the Research Innovation Fund (RIF) at a minimum of 0.05% of GDP, implementing a contributory and tax-deductible R&D levy for large businesses towards development, and establishing R&D linkages and clusters of innovation through effective government-academia-industry-society partnerships (quadruple helix model) are the only ways the government can accomplish these goals.

***Improvement of inclusion and socioeconomic equality and equity in R&D***

Lesotho is still dedicated to carrying out its obligations under the SADC Protocol on Gender and Development (2008), the African Union Protocol on the Rights of Women (2003), and the United Nations Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW). Gender equality is defined as the equitable enjoyment of rights and access to opportunities and results, including ownership of resources by women, men, girls, boys, and other marginalised groups, according to the Lesotho Gender and Development Policy (2018–2030). Groups that are marginalised include individuals that are economically underprivileged, socially marginalised or have been pushed to the periphery of society as a result of the rural-urban divide. To put it another way, the goal of Lesotho is to achieve socioeconomic equality and inclusion for every member of society.

The nation has achieved notable strides in a number of gender-related areas, such as leadership, political engagement, and gender mainstreaming in public policy and policy execution. Anecdotal evidence, however, suggests that there is a gendered development of skills in Lesotho, with boys predominating in technical schools and girls tending to gravitate more towards technical skills and disciplines like the social sciences, humanities, and craft skills. Girls are also underrepresented in STEM fields. Additionally, there is a noticeable underrepresentation of people with disabilities, herd males, rural youth, and other socially and economically vulnerable groups in STEM and innovation-focused programmes and employment.

Therefore, the government should develop and implement advocacy programmes that support the equitable participation of all social groups in STEM in primary and secondary education as well as at tertiary (higher education and TVET) levels. Additionally, the government should work with local and international partners to develop and implement effective strategies to address stereotypes, social norms, and practices that affect girls and women, rural youth, herd boys, the disabled, and other marginalised groups in education and research. Finally, the government should conduct capacity-building programmes for local stakeholders, including parliamentarians, on STEM and socioeconomic advancement.

***Integration of indigenous knowledge systems (IKS) and management of intellectual property (IP) protection***

Lesotho boasts a vibrant cultural history. Certain lifestyle activities, such as manufacturing tools, curing illnesses in humans and animals, or changing behaviour, have been handed down through the generations. Due to a lack of regulations, one of the biggest issues the nation was experiencing was managing traditional knowledge systems, particularly traditional medicine. Key IK system components, like access and benefit sharing (ABS) and intellectual property rights (IPR), lacked protective policies. The 1989 Industrial Property Order and 1989 Copyright Order did not specifically address the problem of IK systems, making it nearly impossible for an individual to safeguard their indigenous knowledge.

It is long past time to take steps to properly secure this traditional knowledge through IPR, build safe repositories for preservation and conservation, and set up support programmes for its promotion if it is to be successfully regulated and commercialised. Like other African nations, Lesotho has come to understand the value of its resources and knowledge. The formalisation of indigenous knowledge from local communities in the areas of health, agriculture, food, and environmental management is the main goal of the Lesotho Indigenous Knowledge Systems strategy (2021). In order to achieve inclusive socioeconomic development, this knowledge must be exploited through commercialisation in order to benefit the livelihoods of indigenous knowledge holders in Basotho as well as society at large.

## 3.2 POLICY APPROACHES FOR GENDER-INCLUSIVE TECHNOLOGY: CREATING AN ENABLING ENVIRONMENT FOR WOMEN, YOUTH AND TECHNOLOGY

This section underscores the imperative of mainstreaming gender and leveraging technology to ensure equitable access to health services, thus fostering long and healthy lives, improving living standards, advancing knowledge development, and promoting social inclusivity among diverse populations in Lesotho. The utilisation of technology and innovation holds significant potential for enhancing living standards among both males and females, particularly through targeted interventions. Notably, the prevalence of female unemployment exacerbates poverty and undermines living standards. However, advancements such as mobile technology have democratized access to media, benefiting both genders. Yet, disparities persist, with males dominating land ownership, highlighting gendered inequalities. To fully capitalize on the

agricultural sector's potential to boost economic growth and living standards, increased adoption of technology is essential.

In terms of gender equality and healthcare, the findings reveal an encouraging trend in rising life expectancy and significant progress towards achieving HIV treatment coverage targets. Technology plays a pivotal role in preventing gender-based violence and improving care for vulnerable groups, notably women and children. Leveraging technology for reporting incidents of gender-based violence to relevant authorities can enhance victim support and law enforcement efforts. Education and gender parity are fundamental aspects of human development. Technology and innovation are vital tools for realizing gender equality in education, necessitating the promotion of e-learning platforms, ICT, and STEM programs for girls, alongside support for male students. However, substantial challenges persist in Lesotho's quest for social inclusion and gender mainstreaming. While commendable progress has been made in enacting gender-sensitive policies and laws, implementation remains hindered by capacity constraints and entrenched cultural norms. Efforts to raise awareness and promote gender equality must extend beyond urban centers to rural areas, where traditional beliefs are more entrenched.

Harmonizing customary and modern legal systems and enhancing transparency and accountability mechanisms are critical steps towards effective gender mainstreaming. Establishing robust quality assurance measures can help prevent and detect corruption, thereby enhancing service delivery and promoting gender equity across all sectors. Providing women and young people with reasonably priced access to digital devices and internet services is a vital first step towards achieving digital inclusion. Public-private partnerships have the potential to lower expenses and increase coverage in underserved and rural areas. Furthermore, women and young people can be empowered to use technology for learning, work, and entrepreneurship by implementing digital literacy programmes in businesses, community centres, and schools.

For women's and young people's health, it is essential to provide access to high-quality healthcare services, including those related to pregnancy and reproductive health. Accessible and reasonably priced health care is a need, particularly in rural areas. Providing women and young people with mental health care via therapy, hotlines, and community programmes can improve their psychological well-being and increase their capacity to make meaningful contributions to society. It is essential to create and put into effect policies that support gender equality and safeguard the rights of young people and women. This includes rules about equal pay, legislation prohibiting discrimination, and procedures addressing violence against women. Developing policies that tackle

the unique requirements and obstacles encountered by young people, including work, education, and community involvement, can create an atmosphere that is conducive to their growth.

A thorough support network for women and young people can be established through cooperation between public and corporate sectors, as well as non-governmental organisations (NGOs). These collaborations might make it easier to share resources and carry out programmes. The success and durability of initiatives aimed at improving human capital can also be guaranteed by putting in place systems for tracking and assessing them. Policy changes and advancements can be informed by data collecting and analysis. In conclusion, enhancing human capital requires establishing an atmosphere that is supportive of women, young people, and technology. By emphasising technology, health, education, economic engagement, and supportive policies, Lesotho may enable its people to realise their full potential and support sustainable development. To create inclusive and equitable ecosystems that promote growth and innovation for all, policymakers and stakeholders must work together.

## 3.3 MAKING TECHNOLOGICAL CHANGE A FORCE AGAINST CLIMATE CHALLENGES

To foster sustainable and resilient communities through technology and innovation, the government of Lesotho must enhance innovative financing mechanisms, technological infrastructure, capacity development, and knowledge transfer, leveraging data and information systems to expedite the adoption of clean technologies.

The capacity to utilize technology and innovation for climate action hinges significantly on the availability of financial resources. However, Lesotho, as a least-developed country, grapples with limited resources. Presently, it relies on the Southern African Customs Union (SACU) for approximately 40% of its revenue and on South Africa for about 90% of its consumer goods and services (World Food Program, 2020). Moreover, the Lesotho Poverty Assessment by the World Bank (2019) revealed that while the poverty rate declined from 56.6% to 49.7% between 2002 and 2017, over 75% of the population remains classified as either poor or vulnerable to poverty.

Consequently, the economic capacity of the Lesotho government is constrained, with a significant portion of its revenue, particularly SACU revenue, vulnerable to political instability and regional shocks, rendering it less dependable, as evidenced by its downward trend over the years. Moreover, priorities such as poverty reduction, inequality alleviation, unemployment mitigation, and addressing dependency ratios often take precedence in government agendas. These focal

objectives may overshadow investments in climate change adaptation and mitigation strategies that necessitate advanced technology and innovation, potentially undermining key aspects of human development.

Hence, the government of Lesotho must proactively devise innovative strategies to finance technologies aimed at cultivating sustainable and resilient communities amidst climate change. Some innovative financing approaches for such green initiatives include:

- Digital Finance – the depth and coverage of digital finance can effectively promote enterprises to carry out green technological innovation
- Blended finance – A combination of public and private funds that is dedicated for funding climate action
- Green Bonds – These are fixed-income securities
- Carbon pricing – it has the potential to deter carbon emissions by firms and generate revenue for climate action, and
- Climate insurance – It has the potential to protect vulnerable communities by protecting them from financial risks associated with climate change.
- Green Credit – Giving special consideration to firms that practice adaptation and mitigation strategies, with or without technology when approving applications for loans across banks and micro-financial institutions.

Such innovative finance mechanisms will not only generate other sources of revenue that could be targeted for climate action, but it will also enhance the sustainability and resilience of communities.

### 3.3.1 Technological Infrastructure

As per the Technology Needs Assessment (TNA) Report for Lesotho by the United Nations (2022), critical areas requiring enhancement in the nation's science, technology, and innovation for agriculture include low agricultural production and productivity, inadequate water resource data collection and management for conservation, and insufficient infrastructure to support eLearning and an ineffective technical and vocational education and training (TVET) system for education. Additionally, internet access emerges as a cross-cutting issue. The overall technological infrastructure in Lesotho is deemed relatively insufficient, suggesting potential inadequacy for addressing climate change.

The Innovative financing mechanisms previously discussed will be instrumental in bolstering the nation's technological infrastructure due to its substantial capital requirements. Apart from

generating revenue to procure technology for climate action aimed at building resilient communities, strategic partnerships and Build Operate and Transfer (BOT) agreements are necessary for long-term technological installations. These BOT initiatives could be utilized for developing early warning systems, climate-resilient infrastructure, enhanced dryland agriculture, mangrove protection, and resilient water resources, with innovative income generation methods to manage and reimburse investors.

The United Nations Environment Programme (2021) underscores the Importance of adopting a holistic, systematic, and integrated approach to infrastructure development to ensure the implementation of appropriate sustainable infrastructure and prioritize investments that mutually benefit sustainable development, climate mitigation, and adaptation agendas. Furthermore, the International Monetary Fund (IMF) advocates for investment in climate-resilient infrastructure in sub-Saharan African countries to bolster resilience and mitigate emissions growth in the region. It emphasizes the significance of investing in renewable energy, energy efficiency, and sustainable transportation (Mitra and Vu, 2021).

### 3.3.2 Capacity Development and Knowledge Transfer

The United Nations Framework Convention on Climate Change (UNFCCC) has outlined a 5-year plan spanning from 2023 to 2027 to accelerate climate action through technology development and transfer. This plan involves the Technology Executive Committee (TEC) and the Climate Technology Centre and Network (CTCN), aimed at facilitating enhanced action on technology development and transfer to support both mitigation and adaptation efforts, ensuring full implementation of the Convention (UNFCCC, 2022). Through the Technology Mechanism, efforts are underway to scale up climate technology action in developing countries by identifying their specific climate technology needs and devising technology action plans to translate these needs into tangible on-the-ground actions.

For Lesotho, it's imperative to align with and adopt the recommendations stemming from the technology mechanism to enhance the efficiency and sustainability of climate action initiatives. Capacity development also necessitates a comprehensive, long-term strategic approach to educational curriculum planning, ensuring that students are equipped with the technical and psychological skills required to build sustainable and resilient communities through technology and climate action. This strategic alignment has a direct bearing on the human capital development index, fostering improved quality education, reduced health-related risks associated with natural

disasters, and an overall enhancement in quality of life. Moreover, the Lesotho government must prioritize laws and regulations that facilitate the transfer of skills to Basotho individuals. This entails establishing incentives and streamlined procedures to provide access to technology and management service kits for trained locals, ensuring their effective utilization in community development efforts.

### 3.3.3 Leveraging Data and Information System

The UNDP Human Development Report (NHDR, 2018) emphasizes that unlocking the full potential of individuals requires action, which, in turn, relies on information. Thus, providing technologies and tools to leverage data and informatics in the context of climate change not only facilitates data processing and sharing but also serves as a transformative platform for human development. Lesotho's endeavours to bolster resilience to environmental shifts heavily lean on innovation, technology, and robust data and information systems. Nonetheless, Lesotho, like many African nations, grapples with challenges such as inadequate data, limited digital infrastructure, low e-literacy, and resistance to digitalization (Adeola et al., 2023).

On a global scale, technological advancements and innovation, as underscored by Andereola et al. (2021), highlight the burgeoning utilization of various data sources, both conventional and unconventional, particularly in high-income countries. Discerning patterns from these data sources and information systems becomes vital for comprehending climate change trends and their implications for human development. Policymakers can utilize these patterns to preempt potential risks during the planning phase, as emphasized by Walter et al. (2019) and Roger et al. (2022), who regard data and informatics as pivotal innovations for achieving long-term sustainability. George et al. (2021) and the World Economic Forum (WEF, 2021) further elaborate on how data and digital technology can substantially alleviate the adverse impacts of climate change in Africa.

Schubert et al. (20214) highlight significant strides in climate prediction over recent decades, particularly in forecasting from one to six months ahead utilizing Landsat satellite data. This advancement aims to mitigate risks linked to climate variability. Utilizing climatic data and informatics, models like General Circulation Models (GCM) and associated statistical ensemble methods consistently play a vital role in predicting potential climate anomalies. These models hold promise in delivering increasingly valuable forecasts concerning the onset, severity, and duration of disasters, as articulated by Dai (2010). Landsat satellite data has long served as a resource for monitoring environmental changes, enabling early warnings. Pulwarty *et al.* (2014) underscore the

World Meteorological Organization's (WMO) dissemination of global meteorological information, while the Food and Agriculture Organization's (FAO) Global Information and Early Warning System on Food and Agriculture (GIEWS) and the Humanitarian Early Warning Service provide data on major global droughts. Additionally, FAO-GIEWS furnishes country-specific insights into food insecurity.

Despite the significance of data and information systems, (UN, 2019) reports that 63% of low-middle-income countries, including Lesotho, struggle with regular data collection due to various factors like inadequate funding, confidentiality concerns, deficient computer systems and software, and a shortage of technical expertise for harnessing big data sources. The United Nations Conference on Trade and Development (UNCTD, 2019) estimates the annual cost of collecting and monitoring data for SDGs in these countries at approximately $650 million. Conversely, the ongoing COVID-19 pandemic underscores the higher cost of not collecting timely, credible, reliable, and actionable data. Overcoming barriers to leveraging data and information systems necessitates innovative approaches and informatics methodologies for sustainable human development, drawing on lessons learned from digital solutions.

Brennen and Kreiss (2016) advocate for accelerating sustainable climate change adaptation through heightened utilization of information systems, rendering the environment smarter and fostering connections to optimize resource utilization. Information systems facilitate the analysis and interpretation of weather data, establishing a framework for more accurate evaluation of climatic changes by forecasting extreme weather occurrences and responding to them. Additionally, according to Hallegatte (2012), enhancing climatic data generation and improving information systems, along with strengthening early warning capabilities in developing nations to advanced country standards, is projected to lead to: (i) preventable asset losses ranging from $300 million to $2 billion per year due to natural hazards, (ii) averting an average of 23,000 lives annually, based on the Copenhagen Consensus guidelines, and (iii) yielding additional economic benefits in the range of $3 billion to $30 billion each year.

However, despite the challenges in maintaining up-to-date data and information systems, extensive research and implementation efforts have focused on the role of informatics in addressing sustainable human development. To leverage data and information systems for human development in countries like Lesotho, several initiatives are essential. First, providing training in statistical methods and practices to agents and government ministries is crucial. Second, garnering support from regional and international partners to establish environment, climate change, and disaster indicators based on international standards and regional best practices is necessary. Third,

increasing collaboration with various local entities involved in collecting and producing data related to the environment, climate change, and disaster indicators is vital.

In Lesotho, where climate change poses significant threats to communities, robust climatic data and information systems are crucial for safeguarding the population's well-being. These systems provide early warnings and rapid alerts to both the government and local communities, fostering collaboration in climate resilience efforts. Taking cues from successful practices in other countries like Bangladesh's Cyclone Preparedness Program (Habib et al., 2012), Lesotho can establish a community-based early warning system. Leveraging technology and innovations such as mobile apps or community radio broadcasts, vulnerable communities can receive timely alerts, enabling them to take pre-emptive measures against impending climate-related disasters.

A people-centred approach is essential for enhancing the effectiveness of climatic data systems. Learning from India's Cyclone Warning Dissemination System (CWDS), Lesotho can integrate community participation in developing and disseminating early warnings. This involves educating local leaders and residents about interpreting climatic data and involving them in decision-making processes. Additionally, establishing community-based climate adaptation committees, as seen in Peru's early warning systems, can empower local leaders to spearhead preparedness efforts. By doing so, Lesotho can build a resilient foundation that not only protects its people but also instills a sense of community ownership and responsibility in addressing climate-related challenges.

### 3.3.4 Inferences on Human Development Indicators

The adaptation and mitigation strategies employed to combat climate change in Lesotho directly impact human development indicators. Enhancing locals' capacity and knowledge transfer in climate action through technology and innovation leads to an improvement in Basotho's educational standards. Additionally, these strategies help alleviate the negative effects of climate change on health and living standards directly and on education indirectly. Instances of natural disasters like floods and landslides have resulted in the destruction of schools and other educational institutions, highlighting the importance of addressing such crises to prevent further damage.

Furthermore, implementing adaptation, mitigation, and prevention strategies, such as reducing carbon emissions and improving transportation systems, helps mitigate carbon-related illnesses like inflammation and cognitive impairment, ultimately reducing health risks. Climate change often leads to frequent extreme weather events and disruptions in food and water systems, exacerbating

the spread of diseases. For instance, in March 2018, hailstorms and flash floods in Lesotho damaged numerous houses, roads, schools, and health centres, resulting in casualties and displacements, particularly in districts like Quthing, Mafeteng, Mohale's Hoek, and Thaba-Tseka (Relief web, 2018). Mitigating climate change effects is essential for reducing the health risks associated with such disasters and ensuring overall human well-being.

The 2018 hailstorms and flash floods incurred significant damages, estimated at LSL 4.07 million (around US$ 346,000), leading to a direct decline in the standard of living for Basotho. These events have ripple effects, causing indirect impacts that further diminish the living standards of the population. Moreover, implementing adaptation and mitigation strategies, such as enhancing access to drought-resistant crops, promoting crop diversification, and utilizing sustainable irrigation systems, can substantially increase agricultural yields and national income.

Beyond traditional human development indicators, technology and innovation play a pivotal role in enhancing climate action for overall human development. A human development approach prioritizes improving the overall welfare and richness of human life, encompassing education, healthcare, income, and empowerment. Climate risks impose constraints that undermine people's choices and welfare, as outlined in Dercon's conceptual framework (2010), which illustrates the interconnections between climate risk, poverty, vulnerability, and human development. Additionally, Fuentes-Nieva (2010) elucidates how short-term climate shocks can permanently limit opportunities and freedoms, even if wealth levels return to pre-shock levels.

Utilizing technology and innovation to enhance climate action is crucial for advancing human development. For instance, implementing climate-smart technologies like solar-powered plants not only reduces emissions but also improves energy access, thus fostering human development. Similarly, the adoption of floating houses to mitigate floods can significantly reduce damage and loss of life, directly benefiting communities. Moreover, early warning systems enhance preparedness against severe climate impacts, ultimately enhancing overall quality of life. The interconnection between technology, climate action, and human development underscores the importance of integrating innovative solutions into climate policies across all sectors in Lesotho.

Furthermore, policies addressing climate change through technology and innovation should prioritize serving vulnerable groups, including persons with disabilities, the elderly, women, and youth. Research indicates that these groups often bear a disproportionate burden of climate change impacts due to limited capacity and financial resources to mitigate such effects. By prioritizing the needs of vulnerable populations, policymakers can address key human development challenges, as these groups typically lag behind in various human development indicators.

## 3.4 CONCLUSION

Achieving this technological transition is not guaranteed, but a multi-dimensional, long-term strategy driven by a partnership of the public and private sector, accompanied by the international community will increase the chances of success. Even if the transition is achieved and economic growth booms, it does not guarantee that human development will increase. For that, it is required to make sure that at every step of the design and implementation of the strategy there is a people-centred approach- for instance, that technological developments are complement to human skills and not substitutes. The holy grail of innovation, growth and human development is an opportunity too big to miss.

Also, addressing climate change effects through technology and innovation poses a formidable challenge globally, with developed economies continually seeking solutions to mitigate destabilizing impacts. However, for economies like Lesotho, building sustainable and resilient communities is even more daunting. Lesotho's geographic vulnerability to climate change, coupled with its status as a least-developed economy heavily reliant on SACU revenue, limits its ability to invest in transformative technological innovations for effective climate change adaptation and mitigation. Consequently, this financial constraint directly and indirectly impacts Lesotho's human development indicators. In essence, this report underscores the critical importance of promoting climate action supported by technology and innovation to advance human development in Lesotho.

This report examines the adaptation and mitigation strategies for combating climate change in Lesotho and explores how technology and innovations can be leveraged to foster sustainable and resilient communities. Moreover, it analyses the implications of these strategies on human development in Lesotho. The study concludes by offering crucial policy recommendations to policymakers, stakeholders, and international development agencies aimed at facilitating climate-resilient development in Lesotho.

- Lesotho practices few mitigation strategies and at not so high-technological levels. This calls for an imperative climate action audit on the implementation of existing policies and an assessment of the risk exposure of Lesotho to climate change.
- There is need to employ complementary approaches of adaptation and mitigation strategies for managing the risks of climate extremes and disasters and reducing loss and damages.
- Nonetheless, each strategy needs to be adopted on its merits; based on the specific

context, district and time. This is because, authors such as Dick-Sagoe et al. 2023) posits that some of the adaptation strategies may further create some environmental challenges for Lesotho.

- Lesotho can integrate community participation in the development and dissemination of early warnings alongside technology to prevent loss and damage resulting from climate change.
- The government of Lesotho is not economically buoyant to fund technological and innovative initiatives that build sustainable and resilient communities. Innovative strategies that could be employed include the adoption of digital finance, blended finance – A combination of public and private funds that is dedicated for funding climate action, green Bonds, carbon pricing, climate insurance and green credit amongst others.
- There is need for strategic partnerships and Build Operate and Transfer (BOT) agreements that permits technological installation in the short run that will serve the nation for the longer term.
- The government of Lesotho needs to pay attention to the strategies put in place by the technology mechanism of the UNCTAD 5-year plan for more efficient and sustainable climate action.
- Capacity development in technology and innovation require long-term strategic planning of the educational curriculum that orientates students with the technical and psychological skills to build sustainable and resilient communities via technology and climate action. This has to start at the primary or secondary level.
- The government of Lesotho has to institutionalize policies and laws that ensure a transfer of skills to Basotho by foreign investors. There is also a need to put in place incentives and procedures to avail the technology and management service kits for the locals that are being trained.
- The report emphasizes the need for supportive regulatory frameworks, incentives for technology adoption, and investment in research and development.
- The report also advocates for multi-sectoral collaboration, knowledge exchange platforms, and the integration of climate action into national development plans.
- The report calls for concerted effortsfrom all stakeholders to harness the power of technology and innovation to address the climate change challenges facing Lesotho because it is critical to the human development of Lesotho.

The report further highlights that medical technology and innovation can make a significant contribution to the achievement of Sustainable Development Goal 3, on ensuring healthy lives and promoting well-being for all at all ages in Lesotho. This report focuses on important areas of policy consideration including the following:

i. **Strengthening digital health systems**: Investments in digital health infrastructure can improve the efficiency and reach of healthcare services. For example, the Millennium Challenge Corporation (MCC) plans to invest in primary health care equipment and digital health infrastructure in Lesotho, beginning in early 2024 (Millennium Challenge Corporation 2023).
ii. **Transforming healthcare systems**: Digital technology in healthcare and medicine can potentially transform healthcare systems and provide more affordable and accessible services
iii. **Improving healthcare delivery**: Public-private partnerships can be used to improve the delivery of healthcare services. The Maseru Public-Private Integrated Partnership is an example of such a collaboration, which has demonstrated the ability to dramatically improve the volume, breadth, quality, and efficiency of healthcare (Downs et al. 2013).
iv. **Adoption of Artificial Intelligence**: The Ministry of Health in Lesotho has also been working on a Public Health Management Information System (PHMIS) to improve healthcare service delivery and medical records management (Mohlomi 2023). The report recommends the use of Artificial Intelligence (AI) to support the PHMIS, which could enhance healthcare service delivery and medical records management. The deployment of AI in healthcare is streamlining the development of new treatments and drugs, ultimately improving health outcomes (White House, 2023).
v. **Addressing HIV and TB**: Lesotho has a high prevalence of HIV and TB, and digital health interventions can help address these constraints. MCC's investment through the Lesotho Health and Horticulture Compact aims to support the fight against HIV/AIDS by improving access to healthcare services and providing quality care (Millennium Challenge Corporation 2023).
vi. **Supporting decentralized healthcare service delivery**: Innovative healthcare strategies that meet the health needs and preferences of the local people can be recommended for improved healthcare service delivery (Dick-Sagoe, Asare-Nuamah, and Dick-Sagoe 2021).
vii. **Adoption of leapfrogging** technology whereby the country can be able to explore the widespread of the use of renewable energy systems and expand access to the internet (Fetter 2022; Ndlovu and Newman 2020).

## 3.5 POLICY FRAMEWORKS AND WAY FORWARD

The Lesotho National Human Development Report (NHDR) 2024, aimed to explore the impacts and opportunities of technology and innovation in accelerating human development. The theme, "*Exploiting Technology and Innovation for Accelerating Lesotho's Human Development*," underscores the potential of technological advancements to drive progress in various aspects of Basotho life. The primary objectives of this report are to enhance the understanding of the role of technology and innovation in human development, provide robust data and analysis for program strategies, policy prioritization, and financing decisions, and ensure that development is equitable, inclusive, and sustainable, adhering to human development approaches. To achieve these goals, the report delved into several critical areas through commissioned background papers, focusing on gender equality, education, economic transformation, e-governance, climate action, and health.

In addressing these critical areas, this section of the report provides detailed policy recommendations aimed at guiding Lesotho's transition to a knowledge-based economy. A comprehensive "big push" strategy is recommended, involving robust partnerships between the government, international agencies, and the private sector. Significant investments in education, healthcare, nutrition, and physical infrastructure are essential to creating new markets, decent jobs, and a dynamic economy. The government must take a leading role in investing in new ideas and inventions to drive innovation and stimulate economic growth.

Strategic investment and long-term planning are critical to this transition. Developing a clear vision to identify and invest in strategic sectors, promoting research and development, and investing in universities and research institutions are crucial steps. Ensuring transparency and accountability in governance will build trust and facilitate effective implementation. The report emphasizes the importance of initially prioritizing public and private investments in healthcare, STEM-focused education, ICT and network expansion, and road infrastructure. These foundational investments will meet immediate developmental needs and create a conducive environment for further development.

Most importantly, promoting research and development (R&D) is indispensable for driving technological transition, economic growth, and human development. Allocating and leveraging funds for R&D in sectors like technology, healthcare, and renewable energy will foster innovation. Developing a legal and regulatory framework that encourages innovation, protects intellectual property, and facilitates business growth is also paramount. Investing in STEM education and

integrating ICT into all levels of education will cultivate a skilled workforce capable of driving innovation across various sectors.

For this transition to succeed, it needs to be people-centred, especially given the challenges in human development still present in the country. Implementing early childhood development programs focusing on healthcare and nutrition will build a strong foundation for future generations, enhancing human capital development. Developing inclusive job creation strategies, particularly for young people, is vital to ensuring that technological advances benefit the entire population. It is crucial to ensure that technological developments complement human skills rather than replace them.

Thus, in conclusion, a multi-dimensional and long-term strategy driven by public-private partnerships and supported by the international community will increase the chances of success. Regularly assessing the impact of technological advancements on human development will ensure that economic growth translates into improved human development outcomes. By adopting these strategic goals and recommendations, Lesotho can harness technology and innovation to drive sustainable and inclusive human development. This comprehensive and people-centred approach will help Lesotho realize its potential as a technology powerhouse, fostering innovation, economic growth, and an improved quality of life for all Basotho.

## REFERENCES


African Development Bank. (2020). Lesotho Country Strategy Paper 2020-2024. RDGS/ ECCE Maseru.

Andom, Afom T., Hannah N. Gilbert, Melino Ndayizigiye, Joia S. Mukherjee, Christina Thompson Lively, Jonase Nthunya, Tholoana A. Marole, Makena Ratsiu, Mary C. Smith Fawzi, and Courtney M. Yuen. 2023. 'Understanding Barriers to Tuberculosis Diagnosis and Treatment Completion in a Low-Resource Setting: A Mixed-Methods Study in the Kingdom of Lesotho'. *PloS One* 18(5):e0285774. doi: 10.1371/journal.pone.0285774.

Asiedu, E. (2002). On the determinants of foreign direct investment to developing countries: is Africa different? World Development, Vol. 30 No. 1, pp. 107-119.

Asiedu, E. (2004). Policy reform and foreign direct investment in Africa: Absolute progress but relative decline. Development Policy Review, 22(1), 41-48.

Asiedu, E. (2006). Foreign direct investment in Africa: The role of natural resources, market size, government policy, institutions and political instability. World economy, 29(1), 63-77.

Balogun, Tolulope. 2023. 'Data Management of Digitized Indigenous Knowledge System in Repositories'. *Information Development* 39(3):425–38. doi: 10.1177/02666669231186777.

Barakabitze, A. A., William-Andey Lazaro, A., Ainea, N., Mkwizu, M. H., Maziku, H., Matofali, A. X., & Sanga, C. (2019). Transforming African education systems in science, technology, engineering, and mathematics (STEM) using ICTs: Challenges and opportunities. Education Research International, 2019, 1-29

Brennen, S. J., & Kreiss, D. (2016). Digitalization. In K. B. Jensen, R. T. Craig, J. D. Pooley, & E. W. Rothenbuhler (Eds.), The international Encyclopedia of communication theory and philosophy (pp. 1–11). John Wiley & Sons.

Bureau of Statistics (2018). 2018 Education Statistics Report. Maseru: Kingdom of Lesotho

Bureau of Statistics (2019). 2019 Education Statistics Report. Maseru: Kingdom of Lesotho

Bureau of Statistics (2021). Lesotho 2017/2018 Continuous Multi-purpose and Household Budget Survey. Maseru: Bureau of Statistics.

Bureau of Statistics. 2023. '2021 Lesotho Demographic Survey Population Dynamics Analytical Report'. IIIA.

Cao, Xinxi, Yabing Hou, Xinyu Zhang, Chenjie Xu, Peng Jia, Xiaomin Sun, Li Sun, Ying Gao, Hongxi Yang, Zhuang Cui, Youfa Wang, and Yaogang Wang. 2020. 'A Comparative, Correlate Analysis and Projection of Global and Regional Life Expectancy, Healthy Life Expectancy, and Their GAP: 1995-2025'. *Journal of Global Health* 10(2):020407. doi: 10.7189/jogh.10.020407.

Climate Risk Profile: Lesotho (2021): The World Bank Group Country Economy, (2023). Energy and Environment; CO2 emission. https://countryeconomy.com/energy-and-environment/co2-emissions

Commonwealth of Learning (2019a). The Regional Community of Practice (CoP) Quality Assurance Guidelines in Open and Distance Learning (ODL). Burnaby: Commonwealth of Learning

Commonwealth of Learning (2019b) Integrating Employability in Higher Education Institutions: An Introduction to the Commonwealth of Learning's Employability Model for Prospective Partners. Burnaby: Commonwealth of Learning

Council on Higher Education (2020). Final Report on the State of Higher Education 2015/16 – 2017/18. Accessed on 14/11/2023 on the CHE Website: https://www.che.ac.ls/wp-content/uploads/2020/02/Final-State_HE-Report-2018-January-2020.pdf

Dai, A., 2010. Drought under global warming: a global review. Wiley Interdiscip. Rev.: Clim. Change 2, 45–65.

Dercon, S. (2010). Risk, Poverty, and Human Development: What Do We Know, What Do We Need to Know?. In: Fuentes-Nieva, R., Seck, P.A. (eds) Risk, Shocks, and Human Development. Palgrave Macmillan, London. https://doi.org/10.1057/9780230274129_2

Dick-Sagoe C., Hope N. K. and Dick-Sagoe A. N. (2023). Climate change and the livelihoods of food crop farmers in Lesotho: Lessons for the implementation of the national climate change adaptation strategy. Journal of Emergency management, Vol. 21 No. 8. DOI: https://doi.org/10.5055/jem.0674 .

Dick-Sagoe, Christopher, Peter Asare-Nuamah, and Anna Dankwaah Dick-Sagoe. 2021. 'Public Choice and Decentralised Healthcare Service Delivery in Lesotho: Assessing Improvement and Efficiency in Service Delivery' edited by R. Read. *Cogent Social Sciences* 7(1):1969737. doi: 10.1080/23311886.2021.1969737.

Fetter, T. Robert. 2022. 'Energy Transitions and Technology Change: "Leapfrogging" Reconsidered'. *Resource and Energy Economics* 70:101327. doi: 10.1016/j.reseneeco.2022.101327.

FINMARK TRUST (FMT) (2021). Lesotho FinScope Consumer Survey Report 2021

Fitzpatrick, Kayla M., Meagan Ody, Danika Goveas, Stephanie Montesanti, Paige Campbell, Kathryn MacDonald, Lynden Crowshoe, Sandra Campbell, and Pamela Roach. 2023. 'Understanding Virtual Primary Healthcare with Indigenous Populations: A Rapid Evidence Review'. *BMC Health Services Research* 23(1):303. doi: 10.1186/s12913-023-09299-6.

Fong, M. W. (2009). Technology leapfrogging for developing countries. In Encyclopedia of Information Science and Technology, Second Edition (pp. 3707-3713). IGI Global.

Foxon, T. J. (2002). Technological and institutional 'lock-in'as a barrier to sustainable innovation. Imperial College Centre for Policy and Technology Working Paper, 1-9.

Francis, Sarah D., Gerald Mwima, Molibeli Lethoko, Christiana Chang, Shannon M. Farley, Fred Asiimwe, Qixuan Chen, Christine West, and Abigail R. Greenleaf. 2023. 'Comparison of Influenza-Like Illness (ILI) Incidence Data from the Novel LeCellPHIA Participatory Surveillance System with COVID-19 Case Count Data, Lesotho, July 2020 – July 2021'. *BMC Infectious Diseases* 23(1):688. doi: 10.1186/s12879-023-08664-4.

Fuentes-Nieva R. (2010). Shocks that Cheat its Survivors: Disasters and Long-term Development. In: Fuentes-Nieva, R., Seck, P.A. (eds) Risk, Shocks, and Human Development. Palgrave

Macmillan, London. https://doi.org/10.1057/9780230274129_2

George, G., Merrill, R. K., & Schillebeeckx, S. J. (2021). Digital sustainability and entrepreneurship: How digital innovations are helping tackle climate change and sustainable development. Entrepreneurship Theory and Practice, 45(5), 999–1027.

Goldemberg, J. (2011). Technological leapfrogging in the developing world. Georgetown Journal of International Affairs, 135-141.

Government of Lesotho (2018). Gender and Development Policy 2018 – 2030.

Government of Lesotho (2018). National Strategic Development Plan II. Maseru: Ministry of Development Planning.

Government of Lesotho, 2019). Lesotho Labour Force 2019.

Government of Lesotho. (2014). Lesotho Demographic and Health Survey.

Government of Lesotho. (2018). National Strategic Development Plan II 2018/19 to 2022/23. Ministry of Development Planning: Maseru

Government of Lesotho. (2019). Labour Force Survey 2019. Bureau of Statics: Maseru.

Government of Lesotho. (2020). Energy Catalyst Country Guide: Lesotho. Maseru: UKAID.

Government of Lesotho. (2023). National Strategic Development Plan II. Maseru: Ministry of Development Planning.

Government of Lesotho. 2011. 'The Lesotho Health Policy 2011'.

Government of Lesotho. 2018. 'National HIV & AIDS Strategic Plan 2018/19 – 2022/23'.

Government of Lesotho. 2022. 'HEALTH MINISTER LAUNCHES CITIZEN APP – Government Of Lesotho'. Retrieved 14 January 2024 (https://www.gov.ls/health-minister-launches-citizen-app/).

Greenleaf, Abigail R., Gerald Mwima, Molibeli Lethoko, Martha Conkling, George Keefer, Christiana Chang, Natasha McLeod, Haruka Maruyama, Qixuan Chen, Shannon M. Farley, and Andrea Low. 2021. 'Participatory Surveillance of COVID-19 in Lesotho via Weekly Calls: Protocol for Cell Phone Data Collection'. *JMIR Research Protocols* 10(9):e31236. doi: 10.2196/31236.

Habib, Arjumand & Shahidullah, Md & Ahmed, Dilder. (2012). The Bangladesh Cyclone Preparedness Program. A Vital Component of the Nation's Multi-Hazard Early Warning System. 10.1007/978-3-642-25373-7_3.

Hallegatte, S., 2012. A cost-effective solution to reduce disaster losses in developing countries: Hydrometeorological Services, Early Warning and Evaluation. Policy Research Working Paper 6058, World Bank, Washington DC, USA.

http://data.worldbank.org/data-catalog/world-development-indicators Accessed on 13/11/2023.

http://documents.worldbank.org/curated/en/832751537465818570/Unlocking-the-potential-ofLesotho-s-private-sector-a-focus-on-apparel-horticulture-and-ICT.

http://www.gov.ls/wp-content/uploads/2018/04/National_Vision.

https://au.int/sites/default/files/documents/38122-doc-aio_3rd_edition_final_eng_repro.pdf.

https://doi.org/10.1038/s41562-021-01079-8

https://international-partnerships.ec.europa.eu/system/files/2022-01/mip-2021-c2021-9271-mozambique-annex_en.pdf Accessed on 14/01/2024

https://sustainabledevelopment.un.org/content/documents/23777Lesotho_VNR_Report_2019

https://unctad.org/system/files/official-document/dtlstict20097_en.pdf.

https://unesdoc.unesco.org/ark:/48223/pf.

https://www.climateinvestmentfunds.org/sites/cif_enc/files/meetingdocuments/srep_18_4_investment_plan_lesotho_final.pdf.

https://www.gov.ls/wp-content/uploads/2021/06/National-Strategic-Development-Plan-II.

https://www.intracen.org/layouts/2coltemplate.aspx?pageid.

https://www.theglobaleconomy.com/Lesotho/GII_Index.

https://www.trademap.org/Product_SelCountry_TS.aspx?nvpm.

https://www.unicef.org/esa/sites/unicef.org.esa/files/2018-09/UNICEF-Lesotho-2017.

https://www.unicef.org/malawi/reports/malawi-cholera-response-flash-update-6-12-february-2023 Accessed on 13/01/2024.

https://www.wipo.int/ global-innovation-index

Human Development Report (2019) *Beyond Income, Beyond Today: Inequalities in Human Development in the 21st Century*. NY: UNDP.

International Telecommunication Union (2017). The State of ICT in Lesotho (2016). https://researchictafrica.net/wp/wp-content/uploads/2018/01/2017_The-State-of-ICT-in-Lesotho_RIA_LCA.pdf

International Telecommunication Union (ITU). (2019). Digital Development Dashboard. ITU. Retrieved from: https://www.itu.int/en/ITU-D/Statistics/Dashboards/Pages/Digital-Development.aspx

International Telecommunication Union [ITU] (2008). *Electronic Government for Developing Countries*. Accessed on 15 November 2014, from http://www.itu.int/ITU-D/cyb/app/docs/e-gov_for_dev_countries-report.pdf

International Telecommunication Union [ITU] (2015). ICT Development Index 2015: Compare countries or regions. Accessed 27 February 2016 from: http://www.itu.int/net4/ITU-D/idi/2015/#idi2015comparison-tab

International Telecommunication Union [ITU] (2016). Committed to connecting the world.

Klinkenberg, Eveline, Bulemba Katende, Maria Ruperez, Moniek Bresser, Bxyn Kangololo, Justin Bwalya, Rahel M. Erhardt, Ab Schaap, Nkatya Kasese, Thomas Gatchie, Sian Floyd, 'Mota J. 'Mota, Helen Ayles, Kwame Shanaube, and Klaus Reither. (2023). 'Creating Access to SARS-CoV-2 Screening and Testing through Community-Based COVID-19 Case-Finding, Observations from Cross-Sectional Studies in Lesotho and Zambia'. *BMC Public Health* 23(1):1414. doi: 10.1186/s12889-023-16306-2.

Knoema. 2023. 'Lesotho Healthy Life Expectancy, 1923-2023 - Knoema.Com'. *Knoema*. Retrieved 12 January 2024 (https://knoema.com//atlas/Lesotho/topics/Health/Health-Status/Healthy-life-expectancy).

Lebuso, and Nicole De Wet- Billings. 2022. 'The Prevalence and Socio-Demographic Correlates of Hypertension among Women (15–49 Years) in Lesotho: A Descriptive Analysis'. *BMC Public Health* 22(1):562. doi: 10.1186/s12889-022-12960-0.

Lee, M. H., & Lio, M. C. (2016). The impact of foreign direct investment on public governance and corruption in China. The China Review, 105-135.

Leeds, B. (2013). Assessing the potential of OERs for ODL. SAJHE, 26(6), 1490-1507. https://journals.co.za/doi/pdf/10.10520/EJC153339

Lesotho Bureau of Statistics, (2021). 2021 Environment Report. Lesotho Bureau of statistics, 8, 2023

Lesotho Communications Authority. (2017) The state of ICT in Lesotho. Published by The Lesotho Communication Authority. Maseru.

Lesotho Ministry of Health (MOH) (2021). Lesotho Population-based HIV Impact Assessment 2020 (LePHIA 2020): Final Report. Maseru: MOH; June 202

Luba, Tegene Regassa, Shangfeng Tang, Qiaoyan Liu, Simon Afewerki Gebremedhin, Matiko D. Kisasi, and Zhanchun Feng. 2019. 'Knowledge, Attitude and Associated Factors towards Tuberculosis in Lesotho: A Population Based Study'. *BMC Infectious Diseases* 19:96. doi: 10.1186/s12879-019-3688-x.

Maema, M and Mohale, M (2017). The SAMEQ IV Project in Lesotho: a study of the conditions of schooling and the quality of education. Maseru: Ministry of Education and Training.

Mathaha, P. (2015) Identifying Key Success Factors for E-Government Implementation: The Case of Lesotho. *Technology Management*, Vol. 1, No. 7, pp.1-38.

Matji, R., L. Maama, G. Roscigno, M. Lerotholi, M. Agonafir, R. Sekibira, I. Law, M. Tadolini, and N. Kak. 2023. 'Policy and Programmatic Directions for the Lesotho Tuberculosis Programme: Findings of the National Tuberculosis Prevalence Survey, 2019'. *PLOS ONE* 18(3):e0273245. doi: 10.1371/journal.pone.0273245.

Matsieli, M.L. 2020. *E-government in Lesotho: A policy analysis of the government websites with reference to service delivery*. A thesis submitted for the degree of Doctor of Philosophy in Public Policy in School of Social Sciences, University of KwaZulu- Natal (UKZN).

Matsieli, M.L. and Sooryamoorthy R. 2021. Evaluation of e-government websites in Lesotho:An empirical study. *African Journal of Governance and Development,* Vol 10(1).

Mawela, T., Ochara, N.M., and Twinomurinzi, H. (2017). E-Government Implementation: A Reflection on South African Municipalities. *South African Computer Journal*, 29(1), 147–171.

Mazzucato, M. (2011). The entrepreneurial state. Soundings, 49(49), 131-142.

Metu, A. G., Ajudua, E., Eboh, I., Ukeje, C., & Madichie, C. (2020). Ending youth unemployment in sub-saharan Africa: Does ICT development have any role?. African Development Review, 32, S20-S31.

Millennium Challenge Corporation. (2023). 'MCC Set to Invest in Stronger Digital Health Systems in Lesotho'. Retrieved 11 January 2024 (https://www.mcc.gov/blog/entry/blog-121123-digital-health-lesotho/).

Ministry of Health and Social Welfare. (2014). 'Lesotho Demographic Health Survey 2014'

Ministry of Health and Social Welfare. (2016). 'Lesotho: National Health Strategic Plan 2017-2022'.

Ministry of Social Development (2020). Lesotho: Violence Against Children and Youth Survey, 2018. Maseru: UNICEF.

Mitra and Vu (2021). Boosting Climate Responsiveness in Sub-Saharan Africa's Public Investment. https://www.imf.org/en/Publications/fandd/issues/2021/12/Africa-Boosting-Climate-Responsiveness-SubSaharan-Public-Investment

Mohlomi, Litlhokoe Daniel. 2023. 'Designing a Robust Public Health Management Information System (Phmis) for Improved Health Outcomes in Lesotho'.

Morris, (2021). SACMEQ IV: a study of the conditions of schooling and the quality of education. Paris: UNESCO's International Institute of Educational Planning.

Moshoeshoe, R (2019). The Effect of Free Primary Education Policy on School Enrolment and the Relative Grade Attainment in Lesotho. *Journal of African Economies,* Vol. 28 (5), 511 – 532.

Motjotji, Lisebo, Annah Moteetee, and Lerato Seleteng-Kose. 2023. 'Medicinal Plants of Lesotho: A Review of Ethnomedicinal, Pharmacological and Conservation Studies: Lesotho Medicinal Plants'. *Ethnobotany Research and Applications* 25:1–19.

Moustafa, E. (2021). The relationship between perceived corruption and FDI: a longitudinal study in the context of Egypt. Transnational Corporations Journal, 28(2).

Munyoka, W. (2017). The effect of UTAUT2 moderator factors on citizens' intention to adopt e-government: the case of two SADC countries. *Problems and Perspectives in Management*, 15(1), 115-123.

Nair, M., Pradhan, R. P., & Arvin, M. B. (2020). Endogenous dynamics between R&D, ICT and economic growth: Empirical evidence from the OECD countries. Technology in Society, 62, 101315.

Ndlovu, Vinnet, and Peter Newman. 2020. 'Leapfrog Technology and How It Applies to Trackless Tram'. *Journal of Transportation Technologies* 10(3):198–213. doi: 10.4236/jtts.2020.103013.

Nkosi, Sibongile. 2016. 'Free Maternal Healthcare Saving Lives in Lesotho'. Retrieved 13 January 2024 (https://www.printfriendly.com/p/g/nVduz4).

Nyabanyaba, T (2015) 'Improving the quality of education among rural learners through the use of open and flexible approaches in Lesotho's secondary schools', published in a special edition on Sustainable Rural Learning Ecologies: Border Crossing (SURLEC) of the *South African Journal of Higher Education in Africa*. 13 (1 & 2), 111 – 132.

Nyabanyaba, T, Marake, M, Nketekete, M and Mojalefa, M (2023). National University of Lesotho Stakeholder Engagement Report. Technical Report prepared for the National University of Lesotho Council.

Nyabanyaba, T. (2012). Baseline Assessment of the State of Quality Assurance in Nursing Institutions in Lesotho: Report submitted to Lesotho Nursing Education Partnership Initiative (NEPI).

O. Adeola et al., (023). Gender Equality, Climate Action, and Technological Innovation for Sustainable Development in Africa, Sustainable Development Goals Series, https://doi.org/10.1007/978-3-031-40124-4_5

Ofori-Brobbey, K., & Ojode, L. (2009). The effect of governance quality on foreign direct investment flows into Sub-Saharan Africa. The Journal of International Management Studies, 4(2), 222-230.

Ogbonna, A. E., Adediran, I. A., Oloko, T. F., & Isah, K. O. (2023). Information and Communication Technology (ICT) and youth unemployment in Africa. Quality & Quantity, 57(6), 5055-5077.

Omer Z and A.A Francisca (2021). How can Lesotho get more value for money from investment in Health? World Bank Blogs.

Paramaiah C, N.J Sakoane, R. Machema, and C Gomo (2020). Gender and Multi-dimensional Poverty in Lesotho. Psychology and Educational Journal. https//doi.org/10/17762/pae.v57i9.3352.

Phosisi, I (2019). Integrated curriculum in Lesotho: Challenges encountered by learners through their teachers' views. Dissertation submitted in fulfillment of the requirements for the degree of Master of Social Sciences (Sociology). University of KwaZulu-Natal, South Africa.

Pillay, P (2008) Higher Education Funding Frameworks in SADC. Study Series, Southern African Regional Universities Associations. Accessed on: https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=dfe37680cae831ab68423c79319f213d0323e0da on 16/11/2023

Population Reference Bureau. (2007). 'World Population Highlights 2007: HIV/AIDS'. *PRB*. Retrieved 12 January 2024 (https://www.prb.org/geographical-focus/lesotho/).

Population Reference Bureau. (2019). 'World Population Prospects: The 2020 Revision'. *PRB*. Retrieved 12 January 2024.

Pulwarty R.S. and Suvakumar M.V.K. (2014). Information Systems in a changing climate: Early Warnings and drought risk management. Weather and Climate Extremes. Elsevier 3 (2014) 14-21.

Quenum, Adoni Conrad. 2023. 'Lesotho to Launch Interoperable National Digital Health System with MCC Support - We Are Tech'. Retrieved 13 January 2024 (https://www.wearetech.africa/en/fils-uk/news/public-management/lesotho-to-launch-interoperable-national-digital-health-system-with-mcc-support).

Rosenstein-Rodan, P. N. (1957). Notes on the Theory of the. Big Push. Economic Development Program, Italy Project C/57-25.

Schubert, et al., 2014. Prospects to advance drought understanding, monitoring and prediction

World Climate Research Program and NOAA Drought Task Force. Rev. Geophys. (in press).

Schwitters, Amee, Stephen McCracken, Koen Frederix, Reese Tierney, Masebeo Koto, Nahima Ahmed, Kyaw Thin, Trudy Dobbs, Sakhile Sithole, Mosilinyane Letsie, Bharat Parekh, Hetal Patel, Sehin Birhanu, Lubbe Wiesner, and Andrea Low. 2022. 'High HIV Prevalence and Associated Factors in Lesotho: Results from a Population-Based Survey'. *PLoS ONE* 17(7):e0271431. doi: 10.1371/journal.pone.0271431.

Setsabi, A. M. (1987) *Development Through Adult Education: Views from Antigonish and BOLESWA*. Morija Printing Works.

Solow, R. M. (1956). A contribution to the theory of economic growth. The quarterly journal of economics, 70(1), 65-94.

Stahlman, Shauna, Ashley Grosso, Sosthenes Ketende, Stephanie Sweitzer, Tampose Mothopeng, Noah Taruberekera, John Nkonyana, and Stefan Baral. (2015). 'Depression and Social Stigma among MSM in Lesotho: Implications for HIV and Sexually Transmitted Infection Prevention'. *AIDS and Behavior* 19(8):1460–69. doi: 10.1007/s10461-015-1094-y.

Steele, Sarah Jane, Hartini Sugianto, Quentin Baglione, Sandra Sedlimaier, Aline Aurore Niyibizi, Kristal Duncan, Julia Hill, Jesper Brix, Mit Philips, Gilles Van Cutsem, and Amir Shroufi. (2019). 'Removal of User Fees and System Strengthening Improves Access to Maternity Care, Reducing Neonatal Mortality in a District Hospital in Lesotho'. *Tropical Medicine & International Health* 24(1):2–10. doi: 10.1111/tmi.13175.

Steinmueller, W. E. (2001). ICTs and the possibilities for leapfrogging by developing countries. Int'l Lab. Rev., 140, 193.

Tlali, S and Hapazari, I (undated). Financing higher education in Lesotho and a selection of other SADC countries. Accessed on 14/01/2024 on the CHE website: https://www.che.ac.ls/wp-content/uploads/2018/12/Prof_Tlali_Conference_Paper.pdf

UNAIDS. (2021). 'Lesotho: 95-95-95 Targets'.

UNDP (2015). *Lesotho Human Development Report 2015: Leveraging the Power of Youth to Promote Human Development.*

UNDP (2023). Draft country programme document for Lesotho (2024 – 2028). New York.

UNDP Human Development Report Office (2018). "Making Data Work for Human Development". Available at: https://hdr.undp.org/system/files/documents/makingdataworkfordevelopmentboninipdf.pdf

UNDP. (2022). UNDP Country Report 2022. Maseru: UNDP Lesotho.

UNDP. 2020. 'Assessment of the Socio-Economic Impact of COVID-19 on the Kingdom of Lesotho'.

UNDP. 2023. 'Achieving Three Dimensions of Scaling Within an Experiment | United Nations Development Programme'. Retrieved 13 January 2024 (https://www.undp.org/lesotho/blog/achieving-three-dimensions-scaling-within-experiment).

UNESCO. (2021). Global Education Monitoring Report. Non-state actors in education: Who chooses? Who loses. UNESCO.

https://unesdoc.unesco.org/ark:/48223/pf0000379875/PDF/379875eng.pdf.multi.page=410

UNESCO. (2023). Global Education Monitoring Report: Technology in Education. From https://education-profiles.org/sub-saharan-africa/south-africa/~technology. Accessed on 13/01/2024.

UNICEF Malawi. (2023). Malawi Cholera Response Flash Update - 6 to 12 February 2023.

UNICEF, and World Bank. 2017. 'Lesotho Public Health Sector Expenditure Review'. doi: 10.1596/29344.

United Nations (2015). *E-Government Survey 2014, E-Government for the Future we want*, New York.

United Nations (2019) 'Climate Action: Why It Matters', Choice Reviews Online, 46(02), pp. 46-0890-46–0890. Available at: https://www.un.org/sustainabledevelopment/wp-content/uploads/2019/07/13_Why-It-Matters-2020.pdf.

United Nations (2022). Launch of the Lesotho Technology Needs Assessment Report Kicks Off Implementation of Projects on Science, Technology and Innovation for Achieving Sustainable Development. https://www.un.org/technologybank/news/launch-lesotho-technology-needs-assessment-report-kicks-implementation-projects-science

United Nations Conference on Trade and Development (2023). The Role of Science, Technology and Innovation in Building Resilient Communities, Including through the Contribution of Citizen Science, 03574(03). doi: 10.18356/3ca6cc2b-en.

United Nations Conference on Trade and Development (UNCTAD) (2019) *Lesotho Rapid eTrade Readiness Agreement Assessment*. Geneva: UN Press.

United Nations Conference on Trade and Development, To Keep Track of the SDGs, We Need a Data Revolution, 2019, 17 January 2019. Available at URL: https://unctad.org/news/keep-track-sdgs-we-need-data-revolution#:~:text=The%20Global%20Partnership%20for%20Sustainable,least%20%241%20billion%20by%202020.

United Nations Development Programme (UNDP). (2019). Lesotho National Human Development Report. UNDP: Maseru.

United Nations Development Programme (UNDP). (2022). Equity, Diversity and Inclusion: Females wanting to be seen in STEM. Available at: https://www.undp.org/lesotho/news/equity-diversity-and-inclusion-females-wanting-be-seen-stem. Accessed on 03/11/2023.

United Nations Development Programme. (n.d.) Human Development Reports: Specific country data. United Nations Development Programme. Retrieved from: https://hdr.undp.org/data-center/specific-country-data#/countries/LSO

United Nations E-Government Survey. (2016). *E-Government in Support of Sustainable Development*, New York.

United Nations Environment Programme (2021). Infrastructure for Climate Action.

https://www.unep.org/resources/report/infrastructure-climate-action.

United Nations Framework Convention on Climate Change (1992). United Nations Framework Convention on Climate Change. FCCC/INFORMAL/84, GE.05-62220 (E) 200705. https://unfccc.int/resource/docs/convkp/conveng.pdf.

United Nations Framework Convention on Climate Change (2022). Joint Work Programme of the UNFCCC Technology Mechanism for 2023–2027: Accelerating Climate Action through Technology Development and Transfer. https://unfccc.int/ttclear/misc_/StaticFiles/gnwoerk_static/TEC_key_doc/07dee8e9fdb44cbe9b26a23a661a0a67/b0d73a0435d44c6da05d2ba44175ceaf.pdf.

United Nations General Assembly Resolution 69/327. (2015). Promoting inclusive and accountable public services for sustainable development. A/RES/69/327.

United Nations, The Sustainable Development Goals Report, Available at URL:, Walter, S., Lörcher, I., & Brüggemann, M. (2019). Scientific networks on Twitter: Analyzing scientists' interactions in the climate change debate. Public Understanding of Science, 28(6), 696–712.

United Nations. (2014) United Nations e-government survey: The future we want. New York: United Nations.

United Nations. (2016). *E-Government Survey 2016, E-Government in Support of Sustainable Development*, New York.

United Nations. (2018). United Nations Development Assistance Framework (UNDAF) for 2019-2023 Signing. Retrieved from: https://lesotho.un.org/en/16650-united-nations-development-assistance-framework-undaf-2019-2023-signing

United Nations. 2023. 'Young Scientists Share Perspectives on the Role of Lesotho Young Academy of Science for National Development. Retrieved 12 January 2024 (https://www.un.org/technologybank/zh/node/1194).

USAID Global Health Supply Chain Program. (2021). 'Lesotho's Electronic Reporting and Requesting (RnR) System Improves Supply Performance and Planning | USAID Global Health Supply Chain ProgramLesotho's Electronic Reporting and Requesting (RnR) System Improves Supply Performance and Planning'. Retrieved 14 January 2024 (https://www.ghsupplychain.org/news/lesothos-electronic-reporting-and-requesting-rnr-system-improves-supply-performance-and).

USAID. (2017). 'Reducing TB-HIV Co-Infection in Lesotho through Innovative Mobile Technology Archive - U.S. Agency for International Development'. Retrieved 14 January 2024 (https://2012-2017.usaid.gov/what-we-do/global-health/hiv-and-aids/success-stories/reducing-tb-hiv-co-infection-lesotho-through).

White House, The White. (2023). 'Delivering on the Promise of AI to Improve Health Outcomes'. *The White House*. Retrieved 13 January 2024 (https://www.whitehouse.gov/briefing-room/blog/2023/12/14/delivering-on-the-promise-of-ai-to-improve-health-outcomes/).

WHO Regional Office for Africa. 2018. 'Regional Digital Health Capacity Building and Curriculum Development Workshop For Digital Health Leaders'.

WHO Regional Office for Africa. 2020. 'Life Expectancy and Healthy Life Expectancy Data'. *WHO*. Retrieved 29 December 2023 (https://apps.who.int/gho/data/view.main.SDG2016LEXREGv?lang=en).

WHO. 2009. 'Country Cooperation Strategy: At a Glance'.

WHO. 2020. *Global Tuberculosis Report 2020*. Geneva: World Health Organization.

Work Bank (2021) 'Climate Risk Country Profile: Lesotho', pp. 1–32. Available at: www.worldbank.org.

World Bank (1978). *World Development Report, 1978*. Washington: The World Bank.

World Bank (2019) *Kingdom of Lesotho Education Public Expenditure Review*. Report Number: 136894-LS.

World Bank (2019). Lesotho Poverty Assessment: Poverty and Inequality Remain Widespread Despite Decline. https://www.worldbank.org/en/country/lesotho/publication/lesotho-poverty-assessment-poverty-and-inequality-remain-widespread-despite-decline.

World Bank Annual Report 2010 Year in Review', World Bank Annual Report.

World Bank Group. (2017). 'Working for a world free of poverty'. Retrieved on 12 February 2017, from http://www.worldbank.org/en/country/lesotho/overview on 20 November 2020.

World Bank, (2023). Lesotho. Retrieved from: https://data.worldbank.org/country/ls.

World Bank. (2019). The World Bank in Lesotho Report

World Bank. (2020). Protecting People and Economies: Integrated Policy Responses to COVID-19. World Bank, Washington, DC. Retrieved from: http://hdl.handle.net/10986/33770 License: CC BY 3.0 IGO

World Bank. (2021). *Digital Dividends: World Development Report*. Washington, DC, USA

World Bank. (2022). Lesotho Policy Notes. The World Bank. Retrieved from: https://elibrary.worldbank.org/doi/abs/10.1596/38359

World Bank. (2022). The World Bank in Lesotho: Overview. The World Bank. Retrieved from: https://www.worldbank.org/en/country/lesotho/overview

World Bank. (2023). Gender Data Portal. Report. From: https://genderdata.worldbank.org/countries/lesotho/#: ~:text=56.2%25%20of%20girls%20and%2039.4,%2DSaharan%20Africa%20aggregate%2C%203. Accessed on 30 December 2023.

World Bank. (2023). Lesotho overview. Retrieved from https://www.worldbank.org/en/country/lesotho/overview. Accessed 15/12/2023.

World Bank. (2023). World Development Indicators database.

World Bank. 2023. 'Gender Data Portal'.

World Food Program, (2020). Lesotho Annual Country Report 2020: Country Strategic Plan 2019 – 2024. https://lesotho.un.org/sites/default/files/2021-09/Lesotho%202020%20Annual%20Country%20Report-Final.pdf

World Health Organization. (2018). Nurturing care for early childhood development. WHO. Retrieved from: https://www.who.int/publications/i/item/9789241514064

World Health Organization. (2023). Over 20,000 Children Vaccinated Against Measles Rubella in Lesotho. WHO. Retrieved from: https://www.afro.who.int/countries/lesotho/news/over-20000-children-vaccinated-against-measles-rubella-lesotho

World Health Organization. (2023). WHO Urges the Government of Lesotho to Prioritize Investment in Government-Funded Public Health Functions and Investing in Primary Health Care. WHO. Retrieved from: https://www.afro.who.int/countries/lesotho/news/who-urges-government-lesotho-prioritize-investment-government-funded-public-health-functions-and

World Health Organization. (n.d.). Health Technologies and Innovations. WHO. Retrieved from: https://www.afro.who.int/programmes-clusters/HTI

# APPENDICES

## Appendix 1: Calculation of the Lesotho Human Development Index (HDI)

The HDI is calculated as a geometric average value of four indices index in two steps: life expectancy index, combined education index, standard of living index and combined ICT. The first step involves calculating dimensional indices. In calculating these indices, minimum and maximum values (goalposts) are set to transform the indicators expressed in different units into indices between 0 and 1. These goalposts act as the "natural zeros" and "aspirational targets," respectively, from which component indicators are standardised (see equation 1). The accepted ranges of these indicators lie within the limits presented in table A1.

### Table A1: HDI Dimensions, Indicators and Values

| Dimension | Indicator | Minimum | Maximum | Values | Sub-Indices |
|---|---|---|---|---|---|
| Health | Life expectancy (years) | 20 | 85 | 61.6 | 0.64 |
| Education | Expected years of schooling | 0 | 18 | 18 | 0.667 |
| | Mean years of schooling | 0 | 15 | 6 | 0.4 |
| Standard of living | GNI per capita (2017 PPP $) | 100 | 75000 | 2736 | 0.5 |
| ICT | Mobile phone subscriptions | 0 | 100 | 79.83 | 0.7983 |
| | Households with a computer | 0 | 100 | 18.0 | 0.180 |
| | Households with internet access | 0 | 100 | 50.9 | 0.509 |

**An Index of each dimension is computed as follows:**

$$Dimension\ index = \frac{actual\ value - minimum\ value}{maximum\ value - minimum\ value} \quad (1)$$

The second step in the calculation of the HDI is aggregating the dimensional indices to produce the HDI which is calculated as the geometric mean of normalized indices for each of the four dimensions as follows:

$$HDI = \left(I_{Health} \cdot I_{Education} \cdot I_{Standard\ of\ living} \cdot I_{ICT}\right)^{\frac{1}{4}}$$

Equation 1 was applied to calculate the indices of the indicators and subsequently, the geometric mean of the indices was calculated to come up with the HDI.

$$Life\ expectancy\ index = \frac{61.6 - 20}{85 - 20} = 0.64$$

$$Mean\ years\ of\ schooling\ index = \frac{6 - 0}{15 - 0} = 0.4$$

$$Expected\ years\ of\ schooling\ index = \frac{12 - 0}{18 - 0} = 0.667$$

$$Combined\ education\ index = \frac{0.4 + 0.667}{2} = 0.5335$$

$$GNI\ index = \frac{\log(2736) - \log(100)}{\log(75000) - \log(100)} = 0.5$$

$$Standard\ of\ living\ index = 0.5$$

$$Mobile\ phones\ subscription\ index = \frac{79.83 - 0}{100 - 0} = 0.7983$$

$$Computer\ ownership\ index = \frac{18 - 0}{100 - 0} = 0.18$$

$$Internet\ access\ index = \frac{50.9 - 0}{100 - 0} = 0.509$$

$$Combined\ ICT\ index = \frac{0.7983 + 0.18 + 0.509}{3} = 0.4958$$

$$HDI = (0.64 \cdot 0.5335 \cdot 0.5 \cdot 0.4958)^{\frac{1}{4}} = 0.5394$$

The sources of data used to calculate the human development index are presented in Table A2.

### Table A2: Sources of Data Used to Compute HDI

| Indicator | Data Source |
|---|---|
| Life expectancy (years) | Lesotho Demographic Survey (2021) |
| Expected years of schooling | https://hdr.undp.org/data-center/human-development-index#/indicies/HDI |
| Mean years of schooling | https://hdr.undp.org/data-center/human-development-index#/indicies/HDI |
| GNI per capita (2017 PPP $) | World Bank (2022) |
| Access to electricity | World Bank (2022) |
| Mobile phone subscriptions | The International Telecommunication Union (2022) |
| Percentage of households with a computer | https://globaldatalab.org/areadata/computer/LSO/ |
| Percentage of households with internet access | https://globaldatalab.org/areadata/table/internet/LSO/?levels=1+4 |

## Appendix 2: Methodology for Assessing Deprivation

Two components of the MPI that follows the methodology by Alkire et al. (2011), have been used to identify people as multi-dimensionally poor. The first component is referred to as the multi-dimensional headcount ratio denoted by H and is presented as

$$H = \frac{q}{n}$$

where q is the number of people who are multi-dimensionally poor and n is the total population (total number of all households who were included in the survey). The second component is referred to as the intensity or depth of poverty denoted by A. This is the average deprivation score of multi-dimensionally poor people and can be expressed as

$$A = \frac{\sum_{i=1}^{n} c_i(k)}{n}$$

In this case, deprivation of individual members of households is measured using each of the indicators under two dimensions, education and standard of living as presented in Table 1.10. Each of the indicators is multiplied with its corresponding weight.

### Table A3: Dimensions and Indicators Used to Assess Deprivation

| Dimension | Indicator | Deprivation | Weight |
|---|---|---|---|
| Education | Years of Schooling | No household member of school entrance age + six years or older (12 years or above) has completed six years of schooling | 1/6 |
| | School Attendance | Any child of school going age (6 to 17 years) in the household is not attending school | 1/6 |
| Standard of living | Electricity | The household has no electricity. | 1/18 |
| | Sanitation | The household does not have access to improved sanitation (according to SDG guidelines), or it is improved but shared with other households. | 1/18 |
| | Drinking Water | The household does not have access to an improved source of drinking water (according to SDG guidelines), or an improved source of drinking water is at least a 30-minute walk from home, roundtrip. | 1/18 |
| | Housing (flooring) | The household floor is made of natural materials such as mud, clay, earth, sand or dung. | 1/18 |
| | Cooking Fuel | The household cooks with dung, wood, charcoal or charcoal or coal. | 1/18 |
| | Assets | The household does not own a car or truck and does not own more than one of the following assets: radio, television, telephone, computer, animal cart, bicycle, motorbike or refrigerator. | 1/18 |

## Appendix 3: Conceptual elaboration and evolution of academic institutions in Lesotho

Academic institutions have conventionally been distinguished from other higher education institutions by scholarly work both in the awarding of academic degrees and the production of academic research output. It is important to note that higher education institutions, particularly universities, have always been entrusted with two missions related to knowledge: contributing to knowledge generation and knowledge dissemination. The complex dual relationship between knowledge generation and dissemination can be seen in the fact that institutions would be generating knowledge through research and disseminating knowledge through both teaching and publication. Some higher education institutions focus more on one rather than the other of either teaching and/or research, but what often distinguish academic institutions from other higher education institutions is the extent to which they generate and disseminate knowledge through research output and publication. However, the nuance is that even among individuals in higher education, the best academics are both active researchers and caring teachers.

Since the beginning of the modern era there has been what is called the third mission of academic institution away from knowledge generation and dissemination purely for knowledge's sake towards engagement with and for community service, a trend. Around the turn of the century that was indeed a mission turn that has been described as the coming down from their 'ivory towers' by academics. There has been a move to connect more with communities and industry, and thus serve society, away from knowledge for knowledge's sake approach. For example, Zimbabwe's Higher Education sub-sector has pursued the multiple mission of higher education into a policy drawing on the 'Five Point Doctrine' with a focus on teaching, research, community engagement, innovation and industrialization (Ministry of Higher and Tertiary Education, Science and Technology Development, undated), emphasising the human-centric utilization of technology and particularly artificial intelligence and big data. There are illustrations of how universities are adopting multiple missions to higher education. One such example is the University of Trans-Disciplinary Health Sciences and Technology in India which is utilizing multi-cultural knowledge and transdisciplinary approaches to promote holistic health.

The distinction for academic institutions can crudely be on the product of such institutions which would include degree offerings as the bare minimum while research output and postgraduate studies would then further distinguish research universities from other academic institutions. This definition takes us to another concept – that of a knowledge worker. A *knowledge worker* is generally

regarded as one works in "non-routine" settings, applying skills to solve problems that require a combination of convergent and divergent thinking (Reinhard *et al*, 2011). The implication of this for the concept of academic institutions would appear to imply that the graduate would have to come out with a 'broad knowledge base that encourages innovation' while applying 'analytic and communication skills' to solve unfamiliar problems (MoET, 2019: 19). The Lesotho Qualification Framework pitches these competencies at level 7, which is a bachelor's degree, currently offered by universities only in Lesotho.

That said, because there is a growing integration of tasks in which there is a great need for codified knowledge such as sales-point instruction manuals, purchasing regulations and promotions even in sub-degree programmes for a knowledge graduate, other higher education institutions are having to transform their programmes to competence-based curricula and away from routine knowledge. And while higher education institutions such as the nursing education institutions in Lesotho do focus on technicians as graduates, they have been undertaking several innovative curricular reforms towards non-routine skills (Nyabanyaba, 2012). Therefore, the population of this study will include universities, colleges and higher education institutions that have undertaken significant curricular reforms, which does include all higher education institutions as defined by the Council on Higher Education.

***Revolutions within and influential to Higher Education Institutions***

The first place to start is the now widely accepted position that more than concerns about the economic returns to higher education, academic institutions provide graduates with choices to advance their own lives in fields that they value. This is in line not only with the human development approach, but also with the knowledge economies that have transformed the employment landscape into rapidly evolving skills requirements. In that context, academic graduates are generally more inclined to undertake lifelong learning than technicians and thus more likely to adapt to emerging skills requirements. Higher education institutions are best placed to adopt technology and innovation not only for transforming academic experience and output, but also for driving economic and social transformation of the entire country and region.

It is important to note that the role of academic institutions in human development pre-dates the establishment of relatively young universities such as the National University of Lesotho. Indeed, changes in the role of higher education institutions away from their ivory tower positions have occurred as purely intrinsic efforts to transform their curricula in the service of society as part of global events. In Lesotho, the establishment of the Institute of Extra-Mural Studies (IEMS) was

driven by a global movement that has come to be known as the Antigonish movement whose Coady International Institute of St Francis Xavier University in Canada founded the then Extension Department of the Pius XII Catholic University College in 1960.

A moment in history is the 1985 conference held in Maseru, Lesotho, bringing together NUL's IEMS, the University of Botswana's Institute of Adult Education and the University of Swaziland's Division of Extra-Mural Services under the theme: BOLESWA Universities' contribution to development through adult education (Setsabi, 1987). The 1985 BOLESWA Conference grounded their orientation to community development from a participatory strategy that was derived from the 1971 United Nations Annual Report that advocated for the integration of community participation in national development initiatives and subsequently raised the value of the expert knowledge of indigenous communities such as small rural farmers (World Bank, 1978). IEMS subsequently evolved into what has come to be referred to as an arm of NUL 'bringing the university to the people' (Setsabi, 1987: 1). More recently, IEMS has adopted Open and Distance Learning (ODL) as a strategy for 'opening up opportunities to higher education and developing human resources' (NUL, n.d. 1).

The rise of the ODL mode of delivery in Lesotho and the rest of the world has generally been driven by the observation that as a mode of delivery, the mode has the potential to open up access to higher education beyond the elite (Leeds, 2013), and particularly provide an alternative access mode for vulnerable and marginalised people (Nyabanyaba, 2013). In extremely unequal societies such as Basotho (World Bank, 2020), where the terrain can further aggravate poverty (May, Roberts and Woolard, 2001) and even limit access to education opportunities, ODL has the potential to enhance the development of poor communities and improve pro-poor access to education (Nyabanyaba, 2015). In the only public university in Lesotho, it is important to note that while the utilization of ODL was an explicit strategic goal for opening up access and IEMS as an arm, of the university to the people, the uptake of the ODL Policy intended to drive this strategy and commitment to it by the NUL management has been found to be both loose and weak (Nketekete and Mojalefa, 2021).

The COVID-19 Pandemic further accelerated the end of the ivory tower, opening up access to knowledge generation and dissemination and pushing research output more into the open access journals, especially with the intrusion of technology in education. One of the main reasons for the failure to realise the full potential of ODL in Lesotho and particularly at NUL is weak investment

in technology (Nyabanyaba *et al*, 2023). This has seen enrolments at the National University of Lesotho drop as a result of what can be described as poor strategic implementation.

The focus on youth and paying attention to the evolution of the economy has become critical for Lesotho. The NSDP II is premised on an inclusive economic growth which is to be achieved through economic diversification and the creation of sustainable jobs, with particular focus on youth. The priorities in the Plan are technology and innovation and given the potential uptake among youth for technology and innovation and given that Lesotho has generally a young population, the rationale is established for the priorities. However, the Plan does note the participation rates among the youth in Science, Technology, Engineering, Arts and Mathematics (STEAM), are extremely low, particularly among female students (GoL, 2018). The situation for Lesotho gets even more intricate when considering that unemployment is also quite high among youth (Bureau of Statistics, 2019), given this low participation rates in STEAM. There has even been a problematic suggestion that the high unemployment is a direct result of the irrelevance of the academic institutions' curriculum (Allen and de Weert, 2007). It can therefore be concluded that the rethinking of the role of academic institutions in building knowledge economies will have to be quite sophisticated.

While academic institutions did undertake some curricular changes at their own paces, external forces have accelerated the transformation, particularly in the onset of Artificial Intelligence. The fourth industrial revolution has propelled technology and innovation to the heart of human development, transforming the world's economy from industrial-based economy to the knowledge economy. The transformation has elevated the higher education subsector to the top of the development agenda, increasing concerns for the relevance and responsiveness of higher education. The role that regulatory bodies such as the Council on Higher Education of Lesotho and other international bodies such as INQAAHE in bringing higher education institutions to account are significant. However, there have also been internal developments in higher education where academic institutions have reviewed their curricula with a paradigm shift from content-based education to competency-based education.

**United Nations Development Programme**
13 UN Road, UN House
Maseru 100, Lesotho.
Tel: (+266) 2222 8000
Website: www.undp.org

# LESOTHO NATIONAL HUMAN DEVELOPMENT REPORT 2024