The Impact of Fintech Develoment on the Financial Inclusion Gender Gap (FIGG) in Sub-Saharan African (SSA) countries.

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Abstract

Development of financial inclusion and gender diversity has gained attention all over the world and this has resulted in international bodies such as the United Nations initiate 17 sustainable development goals with Goals 1 and 5 focused on eradicating poverty and promoting gender equality respectively. These issues still remain persistent in developing countries, especially eradicating the gender gap in financial inclusion. This paper therefore investigates how Fintech could influence the financial inclusion gender gap in Sub-saharan Africa through data visualization. Data on Fintch development and Financial Inclusion gender gap (FIGG) was obtained from the the Global Findex database and the World bank world development indicators database for 2011, 2014, 2017, and 2021. The study used time series plots, chloropleths, bar plots and scatter plots for the analysis.

The result from the time series plot supports the growing trend of FIGG in the SSA region suggested by the World Bank. Th finding also showed that Fintech development in SSA has a positive linear relationship with gender gap associatd with loan accessibility, a negative linear relationship with gender gap associated with account ownership and an almost neutral relationship with the gender gap associated with savings. The study also found that most of the SSA countries studied are similar in terms of the magnitude of financial inclusion gender gap. three dependent (Fintech) variables - access to internet, access to electricity, and mobile telephony ar highly correlated. Thus, further empirical investigation such as regression analysis is recommended to provide in-depth understanding of the association.

Keywords: Financial Inclusion, Gender Gap, Financial inclusion gender gap, Fintech, Development, Sub-Saharan Africa

1. INTRODUCTION

Banna et al. (2022) argue that Financial Technology (Fintech) is one of the most promising technologies because it has the potential to address issues of inequality, poverty, and the lack of access to financial services in Africa. According to Board (2020), the Financial Stability Board (FSB) defines Fintech as a set of technology that facilitates new and improved financial services (including new apps, products, business models, and procedures) for everyone from corporations to individual consumers. With the emergence and adoption of Fintech in Africa, financial market participants both men and women now have more potential to access and use quality financial services which is also as a result of the increasing participation of financial institutions in Fintech solutions. Fintech is more widely used in the West and East Asia, but in Sub-Saharan Africa it has just recently begun to gain traction as a means to expand access to financial services and help the region's impoverished. More than a decade-long investment in ICT in SSA countries has paved the way for Fintech-based financial inclusion, and the quick penetration and acceptance of the technology among financial market stakeholders have made it a reality according to Tchamyou et al. (2019).

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Development of financial inclusion and gender diversity has gained attention all over the world and this has resulted in international bodies such as the United Nations initiate Sustainable Development Goals 1 and 5 focused on eradicating poverty and promoting gender equality respectively. This issue remains in developing countries, particularly in sub-Saharan Africa (SSA), hinted by Demirguc-Kunt et al. (2018), despite the acknowledgement of the importance of female financial inclusion for both economic and sustainable development. Adegbite and Machethe (2020) still identify eradicating the gender gap in financial inclusion as a top priority for the 21st century, which is especially true for SSA, where the financial inclusion gender gap appears to be high. In contrast to the dramatic reductions in gender gaps in access to financial services seen in countries with high and middle incomes, Marie-Hélène Ferrer and Jacolin (2023) argues that the case in SSA is found to widen from its previous 7% in 2011 to 12% in 2021. With the global financial inclusion gender gap standing at 4% according to the 2021 Global Findex Database, that of SSA stands at 12%. This highlights how much work and how urgent it is for the region to reduce this gap. This paper therefore investigates how Fintech could influence the financial inclusion gender gap in Sub-saharan Africa through data visualization.

2. DATA AND METHOD

To examine the relationship between FIGG and FinTech, quantitative data was obtained for a sample of 30 Sub-Saharan African Countries for the periods 2011, 2014, 2017 and 2021. These time points were selected strategically as these are the periods in which Financial Inclusion Data were collected by the World bank. The data was analysed using data visualization. The data included the level of financial inclusion and FinTech use in each of the 30 countries.

2.1. Independent Variable

Since the use of Fintech is impossible without access to electricity, this paper just like Chen et al. (2023) and Demir et al. (2022) used mobile telephony and internet access together with access to electricity as used by Yeyouomo et al. (2023) to measure of Fintech develoment. However, access to electricity influences access to internet and the use of mobile phones, hence there is correlation between these three variables and thus using them together in the same model as done by Yeyouomo et al. (2023) would result in multicollinearity and makes the model inappropriate. This could lead to unstable estimates, reduced precision, and difficulty in interpreting results, thus providing unclear information about the effect of Fintech on the various FIGG variables. To deal with this issue, Fintech development is approximated by a single variable obtained by weighing the effect of each of the Fintech variables on FIGG and computing the weighted average. This single Fintech variable considers the effects of all the three variables.

2.2. Dependent Variable

To measure FIGG, data on the proportion of men and women who have access to and use financial services was collected from the World Bank Global Findex Database. FIGG is often quantified by examining the disparity between men and women in their use of and access to financial services, which is in accordance with Adegbite and Machethe (2020) and Tok and Heng (2022). In this vein, Yeyouomo et al. (2023) computed FIGG as the difference between males and females with access to financial services. Although this is a good measure, the absolute difference fails to provide an accurate comparison between countries. Countries with wide absolute difference may appear to have higher gender gaps which may not be the case due to the difference in population of males and females. To deal with this issue, the current study computes gender gap as the ratio of the difference to the total proportion of males and females with access to financial services. This standardizes the gender gap to promote comparison. With these modifications, the current study examines the impact of Fintech on financial inclusion gender gap in SSA to provide a more nuanced set of results than has been achieved in previous studies. A negative value indicates more women than men and a positive value indicates otherwise. The variables description table below provides information on how the variables were measured and their sources.

Variables	Measurement/Description	Source
Dependent: FIGG		World Bank Global
Acc_GGap	$\frac{M\_Acc - F\_Acc}{T\_Acc}$	Findex Database
Sav_GGap	$\frac{M\_Sav - F\_Sav}{T\_Sav}$	
Loan_GGap	$\frac{M\_Loan - F\_Loan}{T\_Loan}$	
Independent:FINTECH		World Bank's World
Mobile telephony	Mobile phone subscription for 100 people.	Development
Internet access	Subscription to high-speed internet for 100 people.	Indicators (WDI)
Access to electricity	Percentage of access to electricity per 1000 inhabitants.	
Fint	0.516*int_Acc+0.258*E_Acc+0.226*Mtel	
Controls:		
GDP	Logarithm of GDP per capita in US dollars.	WDI
Economic freedom	Measure of free movement of labor, capital, and goods.	Heritage Foundation
Male Pop.	Proportion of male aged 15+ out of total male Population.	WDI
Female Pop	Proportion of female aged 15+ out of total female Population.	WDI

Figure 1: Variable Description Table
Source: Created by Author.

where:

M_Acc = proportion of males aged 15+ who have an account with formal financial Inst or mobile money;

F_Acc = proportion of females aged 15+ who have an account with formal financial Inst or mobile money;

T_Acc = Total proportion of males and females aged 15+ who have an account with formal financial Institution or mobile money;

M_Sav = proportion of males aged 15+ who saved some money with a financial institution in the past year;

F_Sav = proportion of females aged 15+ who saved some money with financial institutions in the past year;

T_Sav = Total proportion of males and females aged 15+ who saved some money with financial institutions in the past year;

M_Loan = proportion of males aged 15+ who obtained loans from financial institutions in the past year;

F_Loan = proportion of females aged 15+ who obtained loans from financial institutions in the past year;

T_Loan = Total proportion of males and females aged 15+ who obtained loans from financial institutions in the past year;

Fint = composite Fintech Development.

3. ANALYSIS

3.1. Yearly Financial Inclusion Gender Gap

In studying financial inclusion in the Sub-Saharan region, the trend of financial inclusion for males and females in the region was observed. Financial inclusion in the area was found to be improving steadily in the region as all the three variables showed appreciation over the years for both males and females. Savings, however, recorded a decline for both genders between 2014 and 2017 as shown in fig.2. This decline appeared to be consistent with the decline in average GDP in the area and the slight decline in employment rate figures 5 and 4 respectively. This is not surprising as the African continent during the same period experienced some economic difficulties caused by but not limited to the outbreak of Ebola in West Africa, political instability

and conflict in countries such as Nigeria, Somalia, Democratic Republic of the Congo (DRC), Central African Republic (CAR), South Sudan, Mali, and Burundi, just to mention a few, significant currency depreciation in many countries (including Ghana, Nigeria, South Africa, Zimbabwe, Zambia, and Angola). These economic issues led to low GDP which could explain the reason for the decline in savings as there was not much for citizens to save considering the hike in commodity prices with fairly no increase in salaries as well as low income. In addition, although financial inclusion seem to be improving in the SSA, it is still low considering that it is still lower than 50% for both males and females. The worst of the three is financial inclusion in terms of loan accessibility. As at 2021, the proportion of males and females that have access to credit from formal financial institutions was below 15%. The study also found that the gap between male and female for account ownership, savings, and loan accessibility continually widened over the year with the gap standing at above 5% in 2021 for each of the financial inclusion indexes.

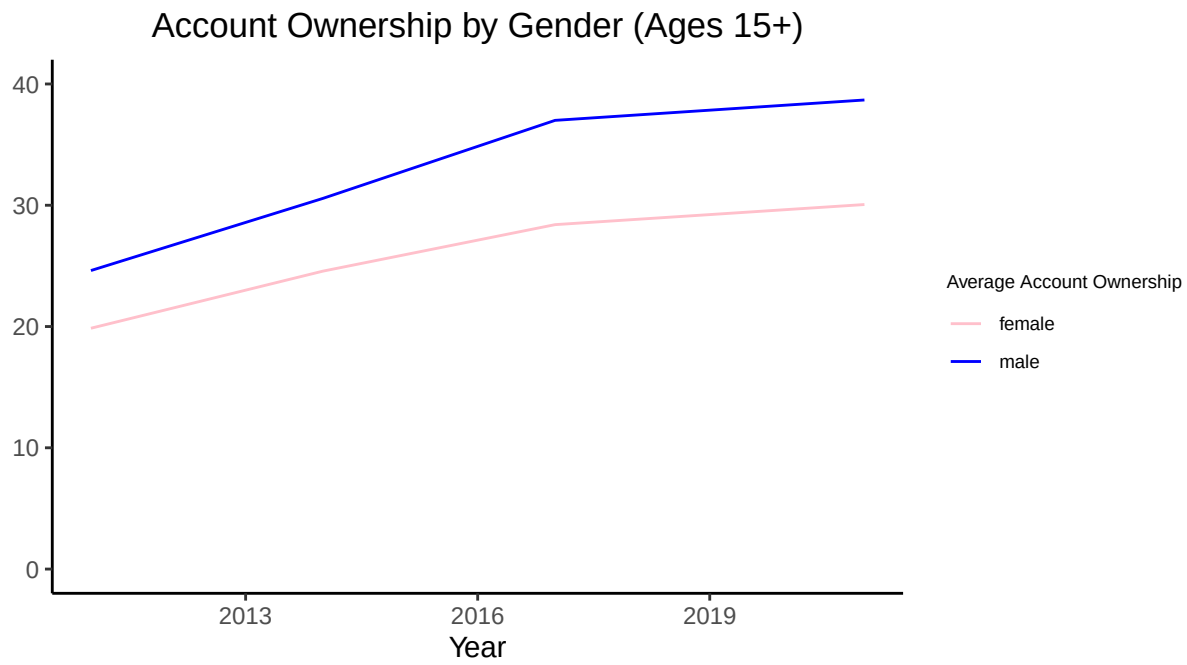


Fig.1: Proportion of males and females aged 15+ who own account at a formal financial institution.
Source: Author based on data from the Global Findex Database, 2021

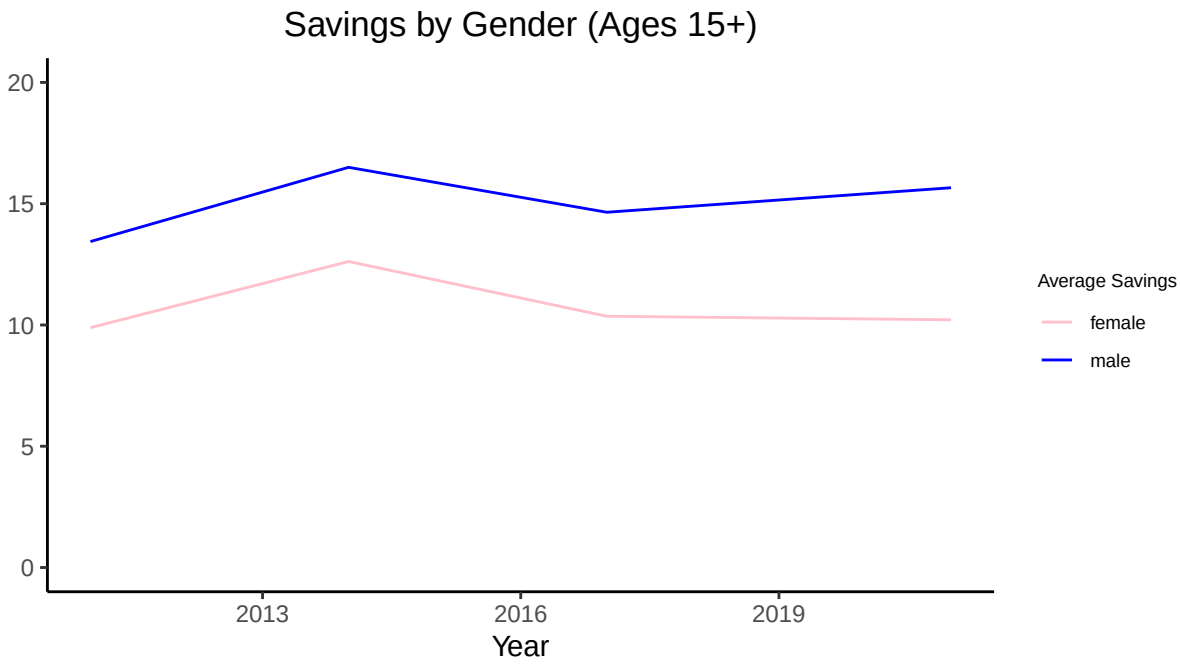


Fig.2: Proportion of males and females aged 15+ who saved some money at least in the past year at a formal financial institution.
Source: Author based on data from the Global Findex Database, 2021

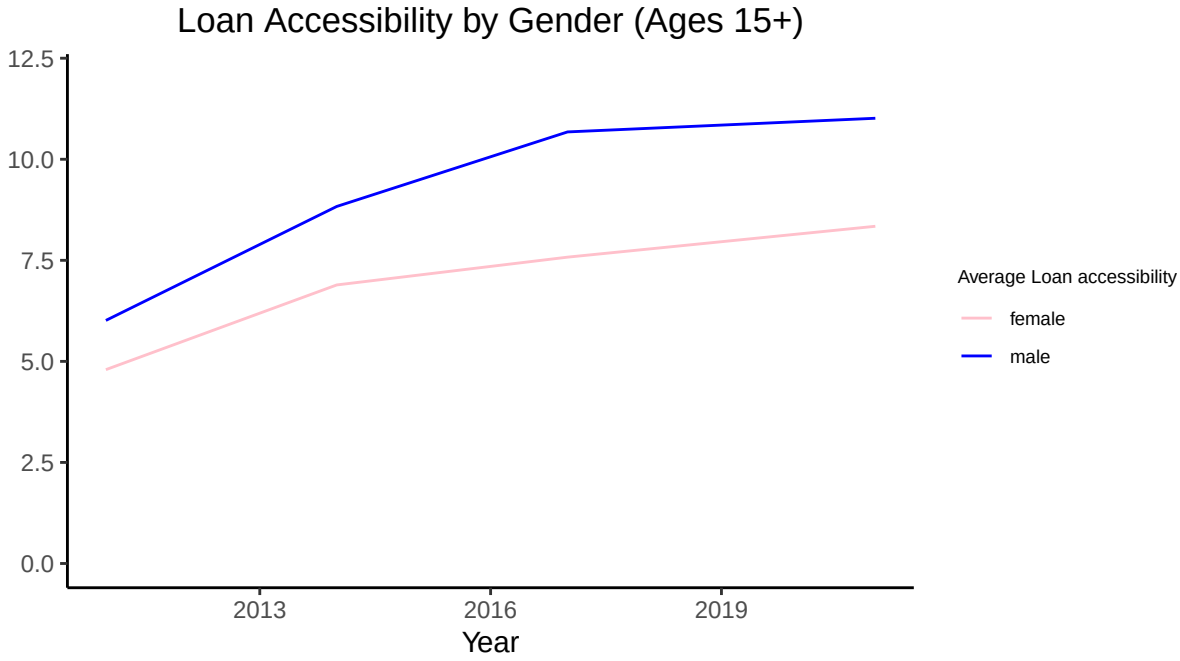


Fig.3: Proportion of males and females aged 15+ who accessed loan at a formal financial institution at least in the past year.
Source: Author based on data from the Global Findex Database, 2021

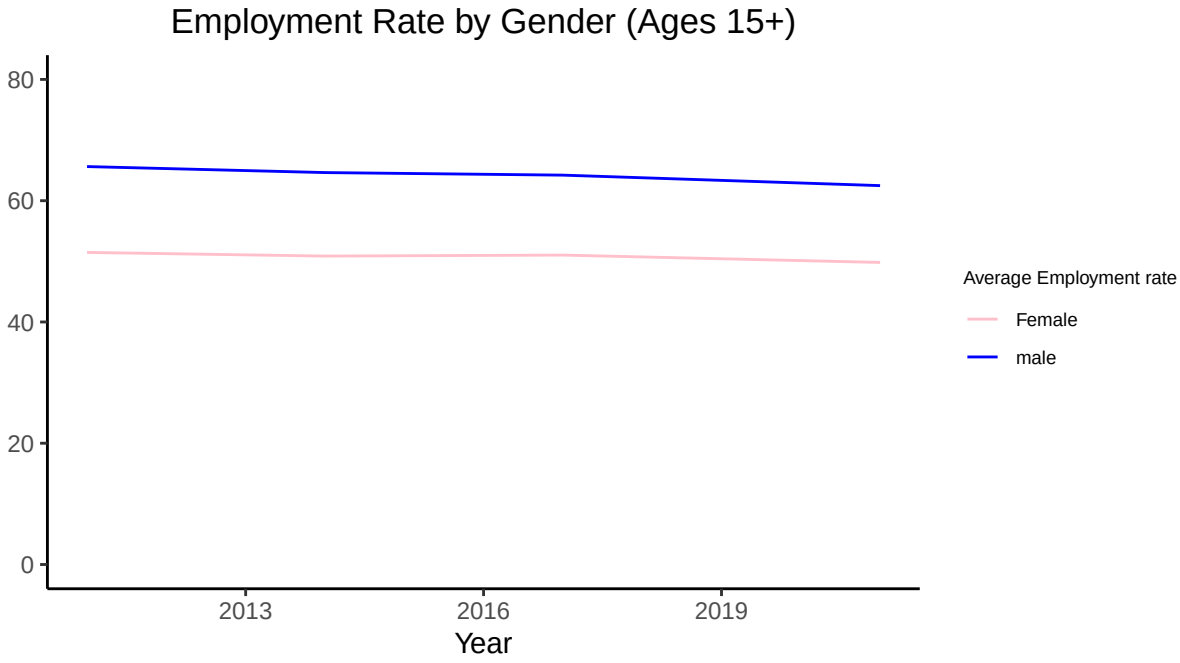


Fig.4: Prpoportion of males and females that were engaged in an economic activity for income (2011−2021).
Source: Author based on data from World Bank World Development Indicators, 2023

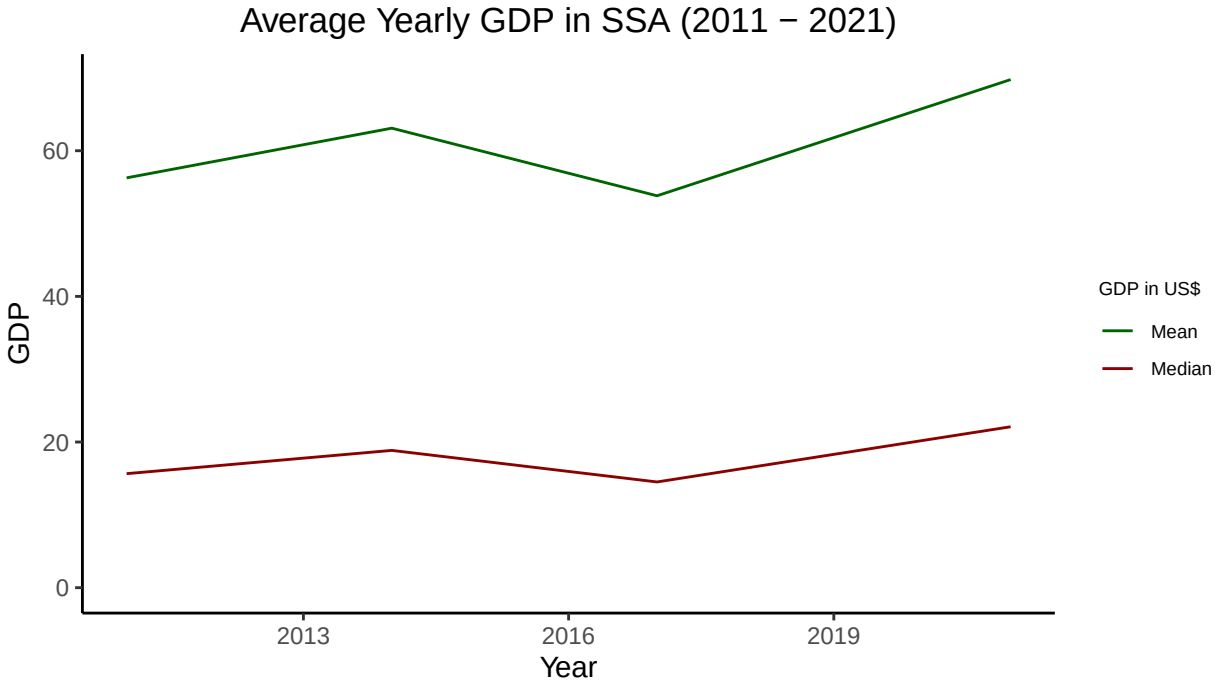


Fig.5
Source: Author based on data from the World Bank World Development Indicators, 2023

3.2. Financial Inclusion Gender Gap per Country

The financial inclusion gender gap was further examined in each of the 26 countries used in the study. The chloropleths below show that on average, gender disparity is almost the same for most of the countries with few countries showing significantly high and low values. For gender gap in relation to account ownership shown in Fig6, majority of the SSA countries have a gap above 10% with only 7 (Ghana, Kenya, Zambia, Namibia, Lesotho, Mauritius, and South Africa) recording gaps less than 10%. South Africa most notably has a negative gap with the proportion females about 0.4% higher than males. Two countries however, Cote d'Ivoire and Sudan have the highest account ownership gender gap (above 30%), thus the proportion of males with formal financial institution accounts is over 30% higher than that of females. In relation to gender gap in savings which is dsiplayed in fig7, the study found that the majority of the countries (21 out of 26) have an average gender gap above 10% and only 6 (Namibia, Zambia, South Africa, Lesotho, Madagascar, and Mauritius) recorded an average gap below 10% with Madagascar recording th lowest of 0.8%. Sudan, Madagascar, and Mozambique averagely recorded a gap greater than 30%. This indicates that on average the proportion of males who save some money in a year are more than 10% or more more than females in the SSA area. Examining the gender gap associated with loan accessibility displayed in Fig8, it was observed that just like the two gender gaps, most of the SSA countries have similar gaps. Eight of the countries recorded a single digit gap on average and the remaining 18 countries recorded average loan gap greater than 10%. Cote d'Ivoire, Gabon, and Mauritius on average recorded more than 30% average loan gender gap with Cote d'Ivoire recording the highest of 43%. Sierra Leone and Malawi recorded gender gaps less than 0 which shows that in this countries more females access loans than males. Thus, considering all the gender gaps together, visuals show that in most of the countries in the Sub-Saharan Africa region the proportion of males that have access to financial services is on average over 10% more than that of females.

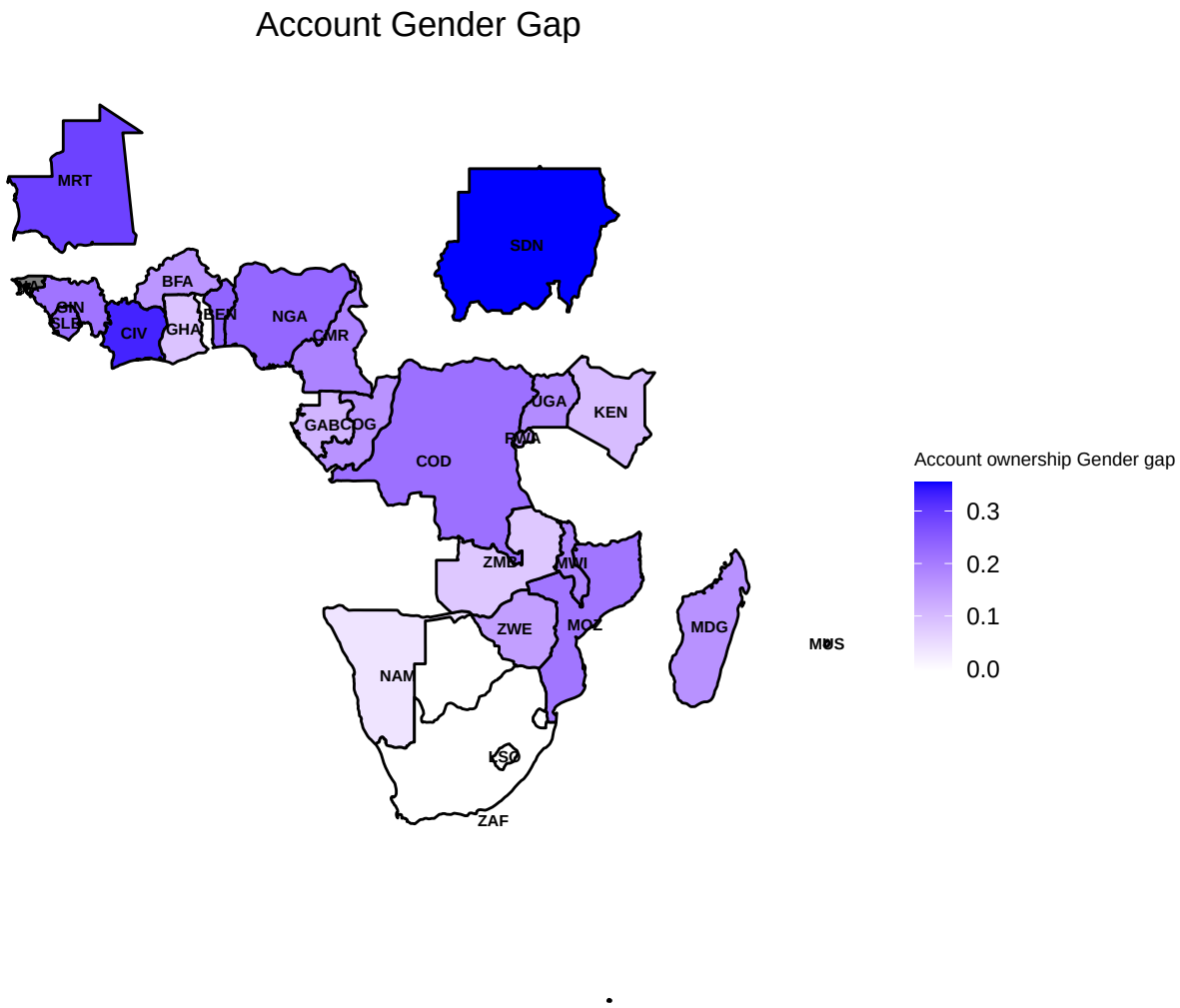
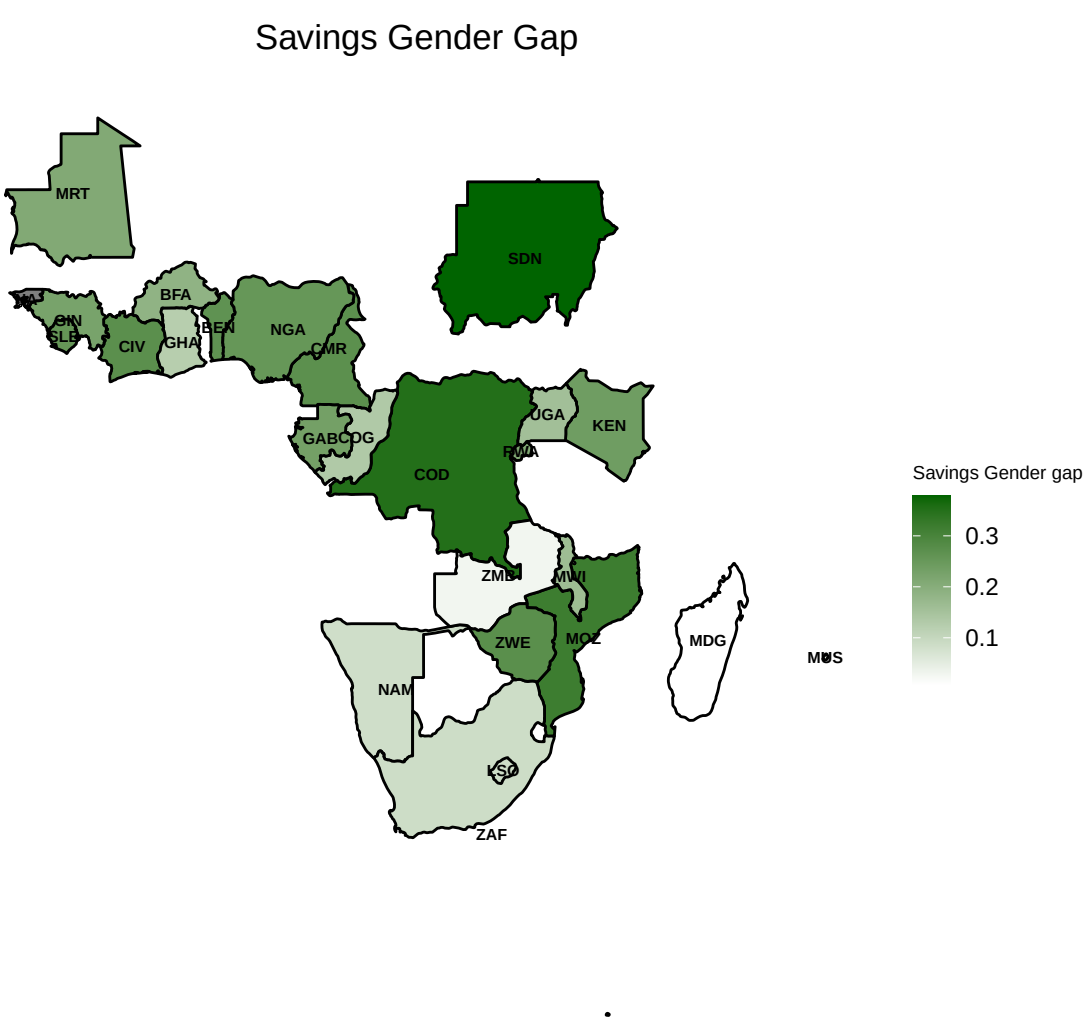


Fig6: Average gender gap in relation to account ownership in SSA Countries (2011−2021).
Source: Author, based on data from the Global Findex Database, 2021



: Average gender gap in savings, at least for the past year at a formal financial institution in SSA (2011−2021).
Source: Author, based on data from the Global Findex Database, 2021

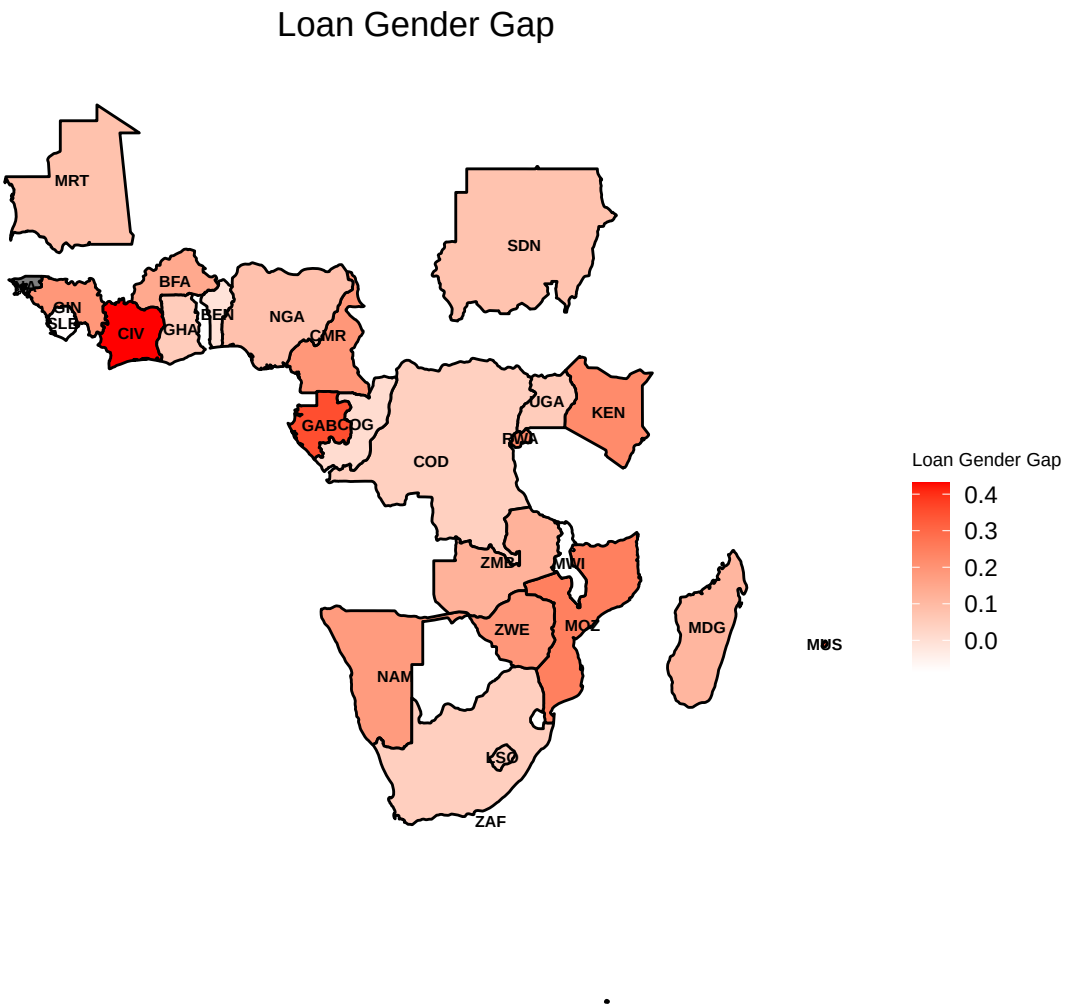


Fig.8: Average gender gap in terms of loan accessibility in SSA Countries (2011−2021)
Source: Author based on data from the Global Findex Database, 2021

3.3. Employment Gender Gap per Country

Employment in the SSA region has been an issue for discussion over the years as this tends to be one of the areas where gender disparity appears to be significant. The study examined the gender disparity in the 26 countries studied in this paper. It was found that 6 of the 26 countries have an average gender gap less than 10%, most of the countries have a gender gap between 10% and 30%, and 4 of the countries have average gender gap greater than 50%. The study found an average gender gap of over 100 % in Sudan and nearly 80% in Mauritania. This is shown in Fig9 below. This employment gender gap tends to agree with the gender gap in financial inclusion shown above.

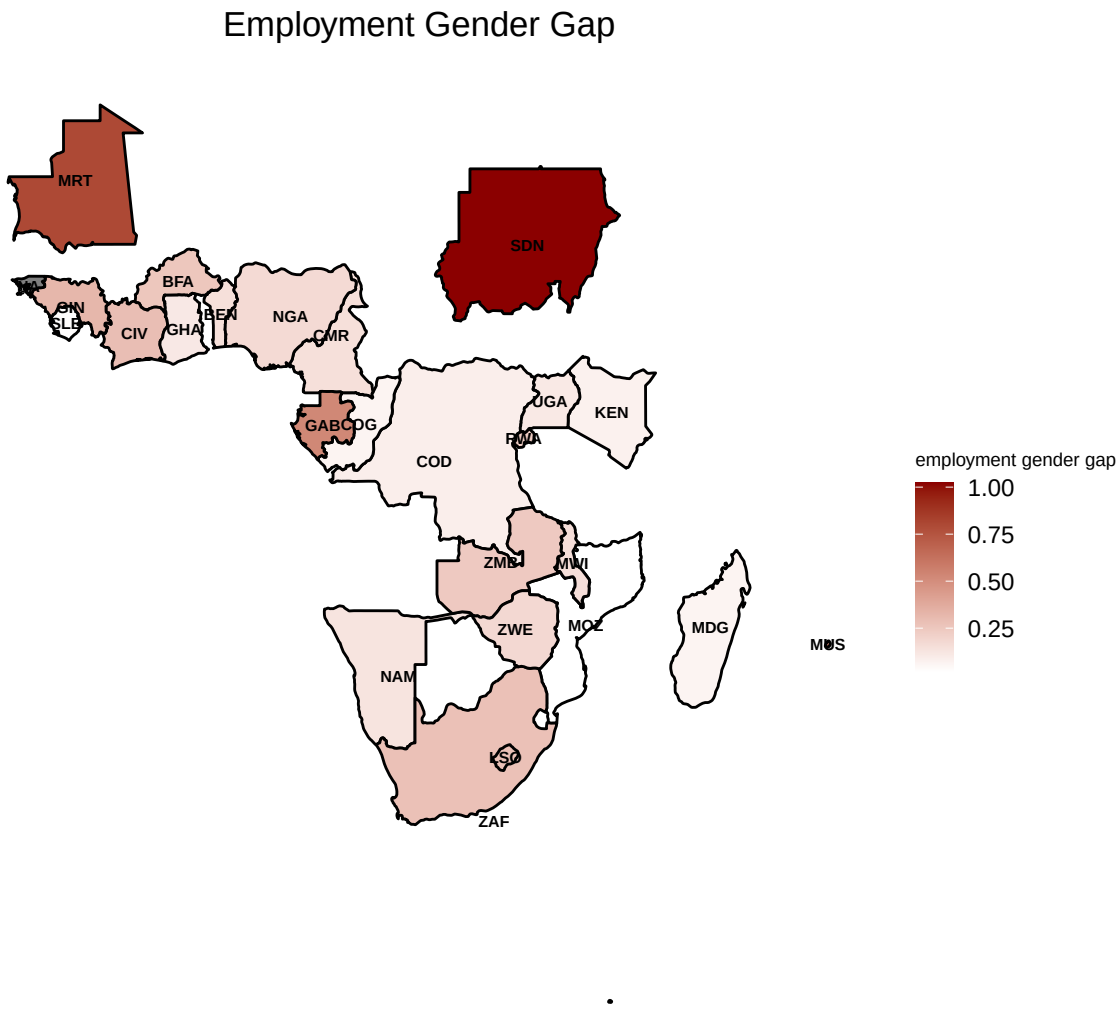


Fig.9: Gender Gap in terms employment rate in SSA Countries (2011−2021).
Source: Author base on data from the Global Findex Database, 2021

3.4. Assessing Individual Fintech Variables

The study further investigated the individual Fintech variables to obtain better understanding of the Fintech ecosystem in the SSA region. Fig10, Fig11, and Fig12 display bar plots that show the development of access to internet, access to electricity and mobile subscriptions in the region from 2011 to 2021 respectively. From the plots, it is observed that internet access was less than 20% for majority of the countries in 2011. This progressed steadily over the years, however, as at 2021, only 7 of the 26 countries have 50% or more of their population having access to internet. Similarly, in 2011, only 7 out of the 26 countries had more than 50% of its population having access to electricity with Mauritius being the only country with nearly 100% electricity access. Apart from Mauritius which had nearly 100% since 2011, access to electricity in the remaining countries developed progressively, however, only 4 other countries had had at least 75% electricity access with Ghana, Gabon, and South Africa being well over 80%. Mobile telephony subscription is the Fintech variable that is very high in the region. As at 2014, only 3 of the 26 countries (Malawi, Mozambique, and Madagascar) had mobile telephony subscription of less than 50% of its population. However, at the end of 2021, 14 of the 26 countries had over 100% mobile telephony with only Mozambique and Malawi recording

lower than 50% subscriptions. This indicates that the use of mobile phone is very high in the SSA region despite the low inyternet access and access to electricity. This suggests that on average, the low access to internet and electricity is quite worrisome for development of Fintech as Fintech development is impossible without the availability of internet and electricity.

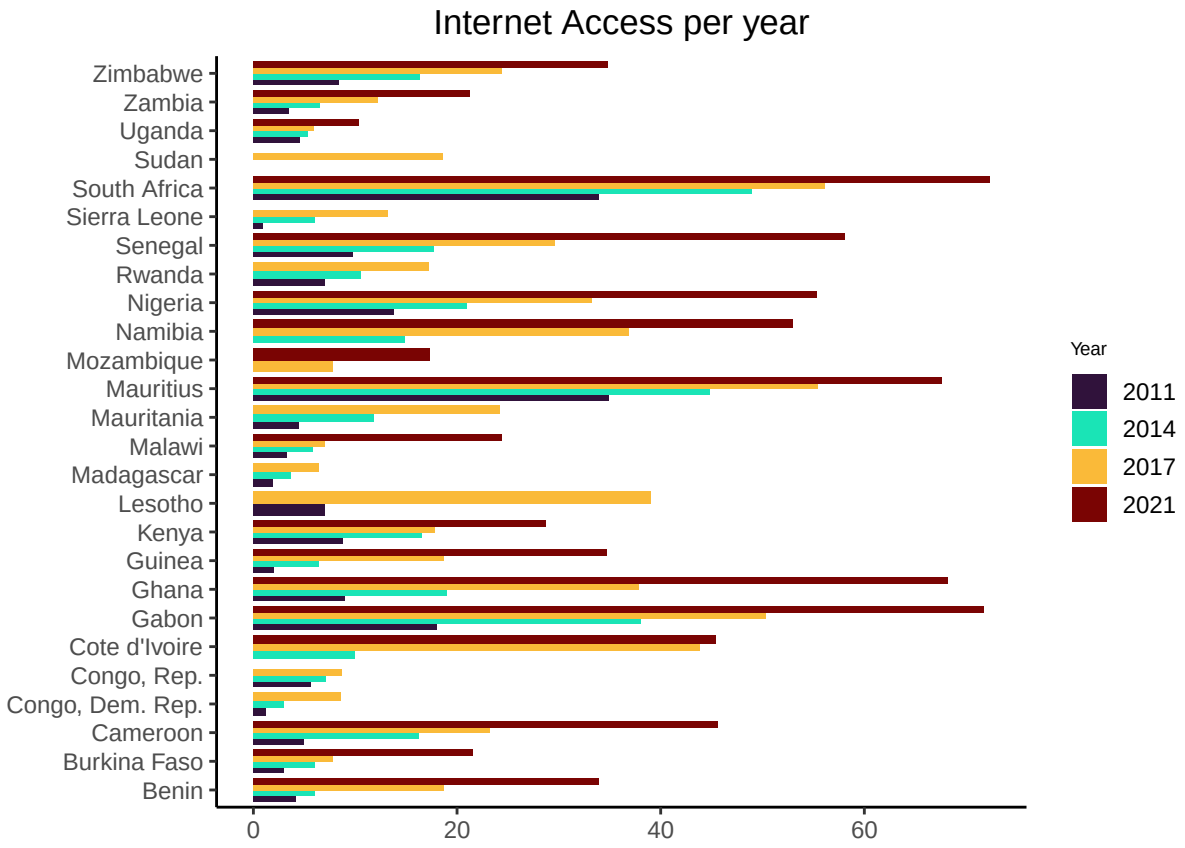


Fig10: Growth of Internet Access per 100 people in SSA Countries (2011−2021).
Source: Author based on data from the World Bank WDI, 2023

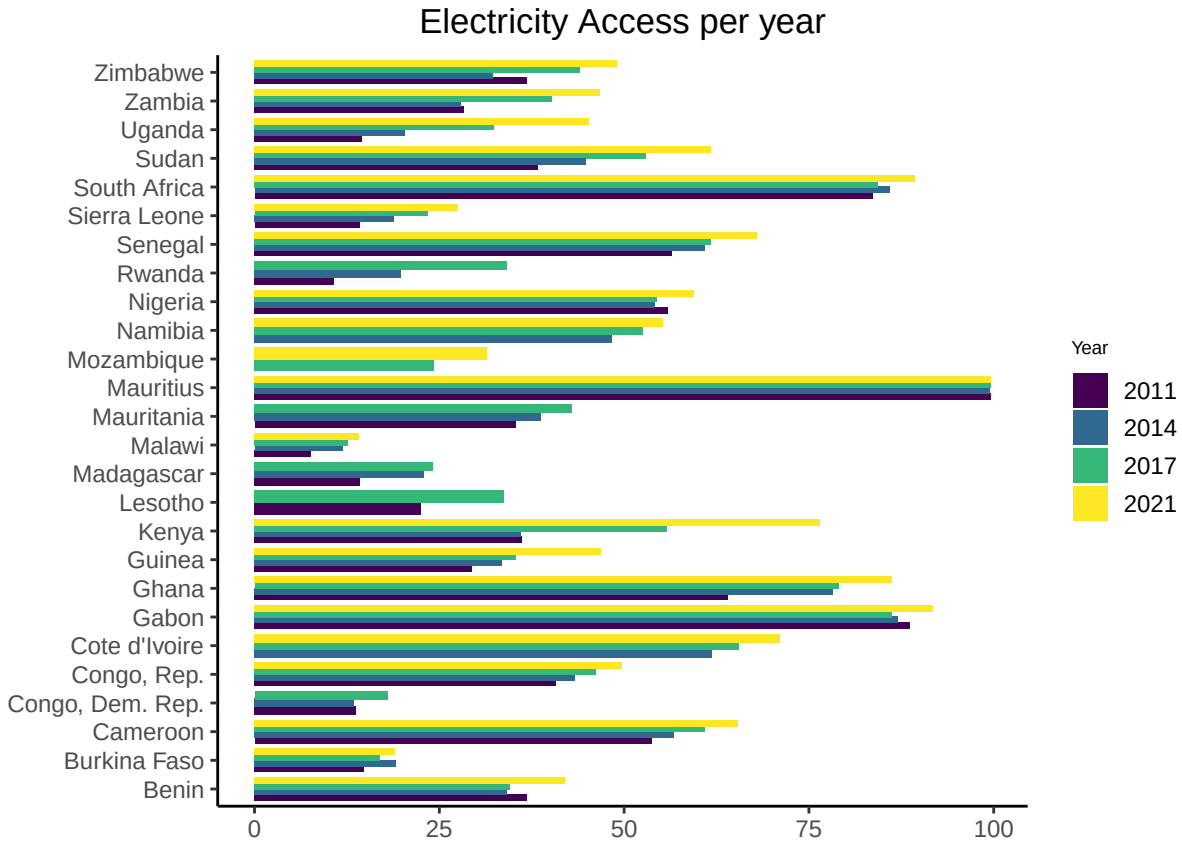


Fig11: Growth of Electricity Access per 100 people in SSA Countries (2011−2021).
Source: Author based on data from the World Bank WDI, 2023

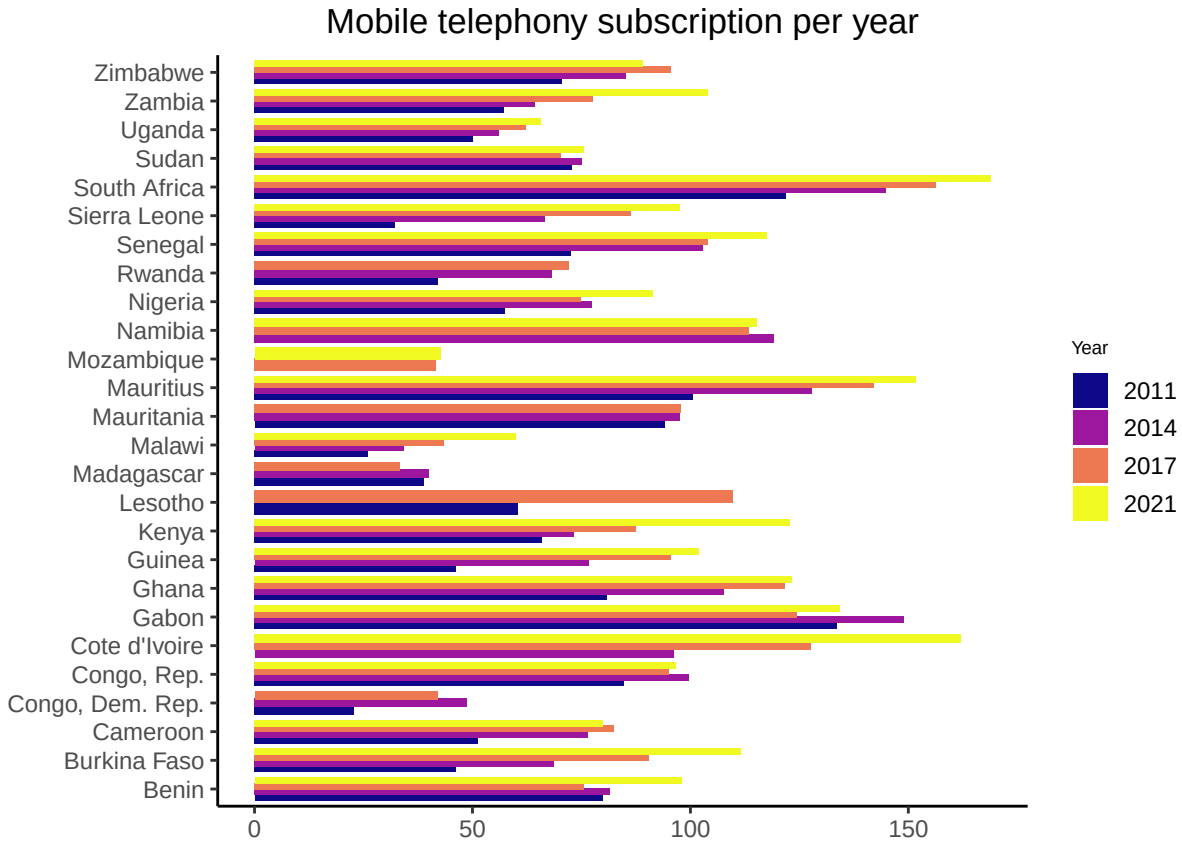


Fig12: Growth of Mobile telphony Subscriptions per 100 people in SSA Countries (2011−2021).
Source: Author based on data from the World Bank WDI, 2023

3.5. Overall Fintech Development in SSA

Fintech development in the 26 SSA countries studied was found to be low on average with only 6 of the countries recording Fintech development of over 50%, the rest have an average value lower than 50% according to Fig13 below. The fact that 20 of the 26 SSA countries have comparatively low average Fintech development highlights how young the Fintech sector is in the area. Fintech's influence and development in Sub-Saharan Africa are still developing, despite its increasing recognition on a worldwide scale as a catalyst for innovation and financial inclusion. Furthermore, the observation that Fintech development exceeded 50% in only six of the twenty-six SSA countries analysed demonstrates the moderate variation in the adoption and progression of Fintech solutions throughout the region. This indicates that factors including technological readiness, regulatory environment, infrastructure, and economic stability may make certain countries more favourable to Fintech innovation. The prevalence of countries with less than 50% Fintech development suggests that numerous SSA countries face obstacles and challenges that impede the expansion of the Fintech industry. Potential obstacles may comprise regulatory limitations, restricted investment and capital accessibility, insufficient digital infrastructure, and a dearth of proficient personnel.

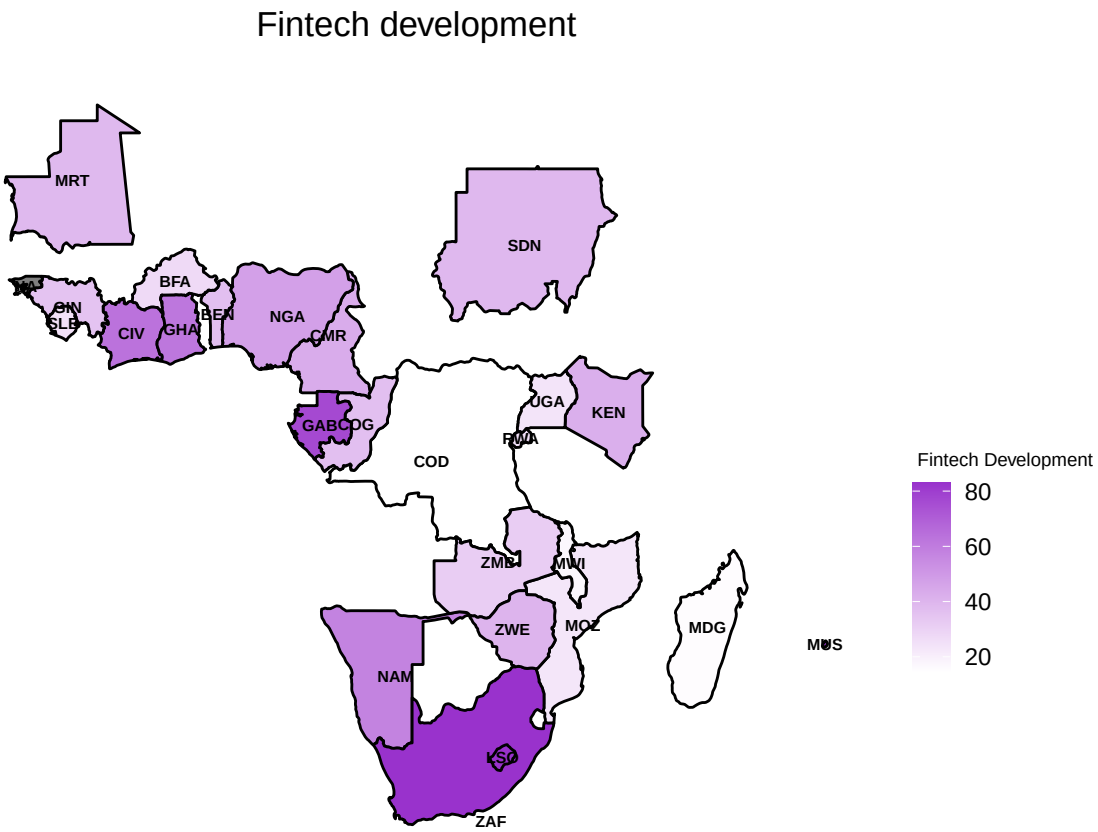


Fig13: Fintech Development in SSA Countries
Source: Author based on data from the Global Findex Database, 2021

3.6. Relationship between Fintech and FIGG

In SSA, the study identifies from Fig14 a linear relationship between FIGG variables and Fintech development. Fintech development in the region has a negative linear relationship with the gender gap in account ownership. This shows that when Fintech dvelopment increase in the area, the gender gap in account ownership will decrease.This negative relationship suggests that advancements in Fintech can contribute positively to financial inclusion efforts, particularly in addressing gender disparities in accessing financial services. It was further found that the relationship is linear and positive between Fintech and the gender gap in Loan accessibility as shown in Fig15. This positive relationship between Fintech development and the gender gap in loan accessibility indicates a concerning trend where increased Fintech development is associated with a widening gap between males and females in accessing formal financial institutions for loans. This could be as a result of gender biases that may be embedded within the design and implementation of Fintech products and services, leading to unequal access to credit for women. Additionally, socio-economic factors such as disparities in digital literacy, ownership of mobile phones or internet access, and cultural norms that may disproportionately affect women's ability to utilize Fintech solutions for accessing credit. Inadequate

access to credit can hinder women's ability to invest in education, entrepreneurship, and productive assets, thereby perpetuating cycles of poverty and inequality since most families are being managed by women and most women are also single parents in the region.

In addition,there is nearly neutral relationship between Fintech and the gender gap in Savings as seen in Fig16. wThis indicates that, while there might be some relationship between Fintech development and the gender gap in savings, it is not significant or substantial. In other words, the impact of Fintech on the gender gap in savings is minimal or negligible. This could mean that Fintech developments do not specifically target or disproportionately affect savings behaviors or access for either gender, or that other factors outweigh the influence of Fintech in this regard.

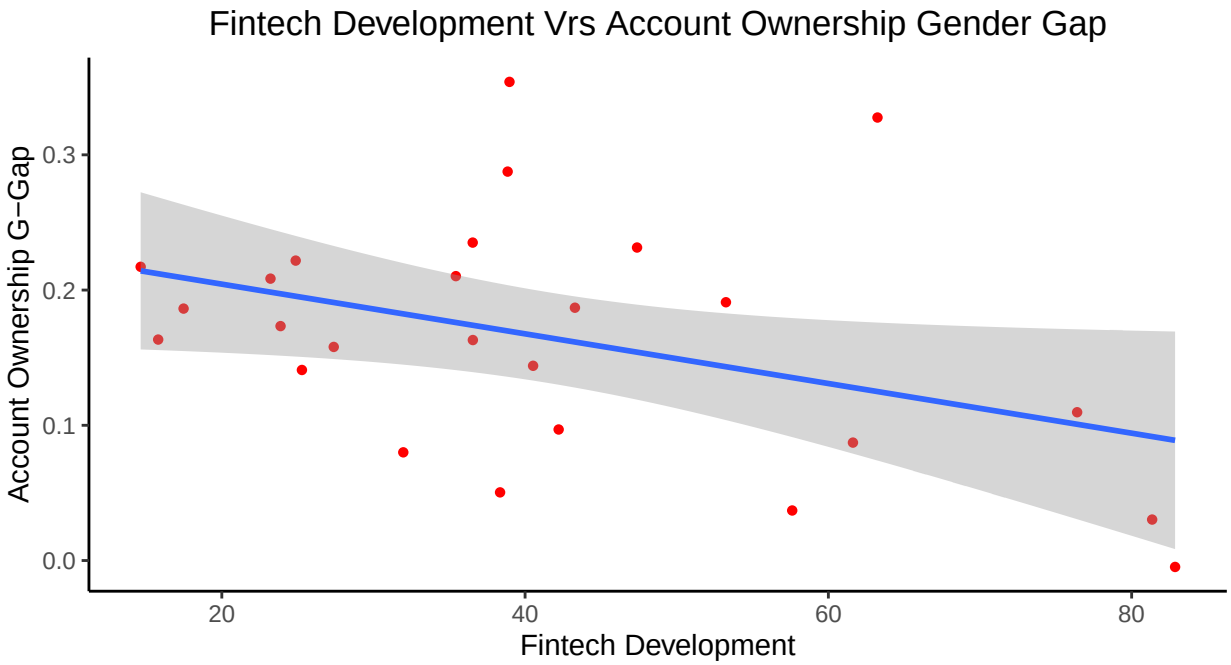


Fig.14: Scatter plot showing the relationship between Fintech development and gender gap in account ownership in SSA.
Source: Author, based on data from Global Findex database (2021) and World bank's WDI (2023)

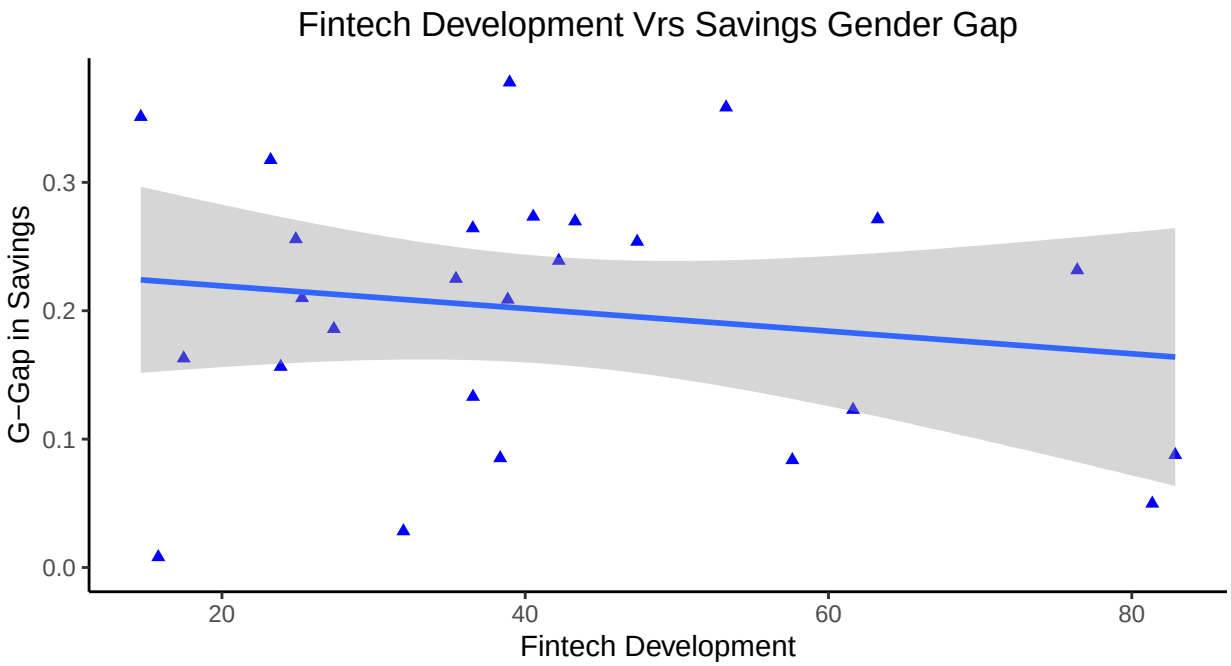


Fig.15: Scatter plot showing the relationship between Fintech development and gender gap in ability to save at a formal finacial institution in SSA.
Source: Author, based on data from Global Findex database (2021) and World bank's WDI (2023)

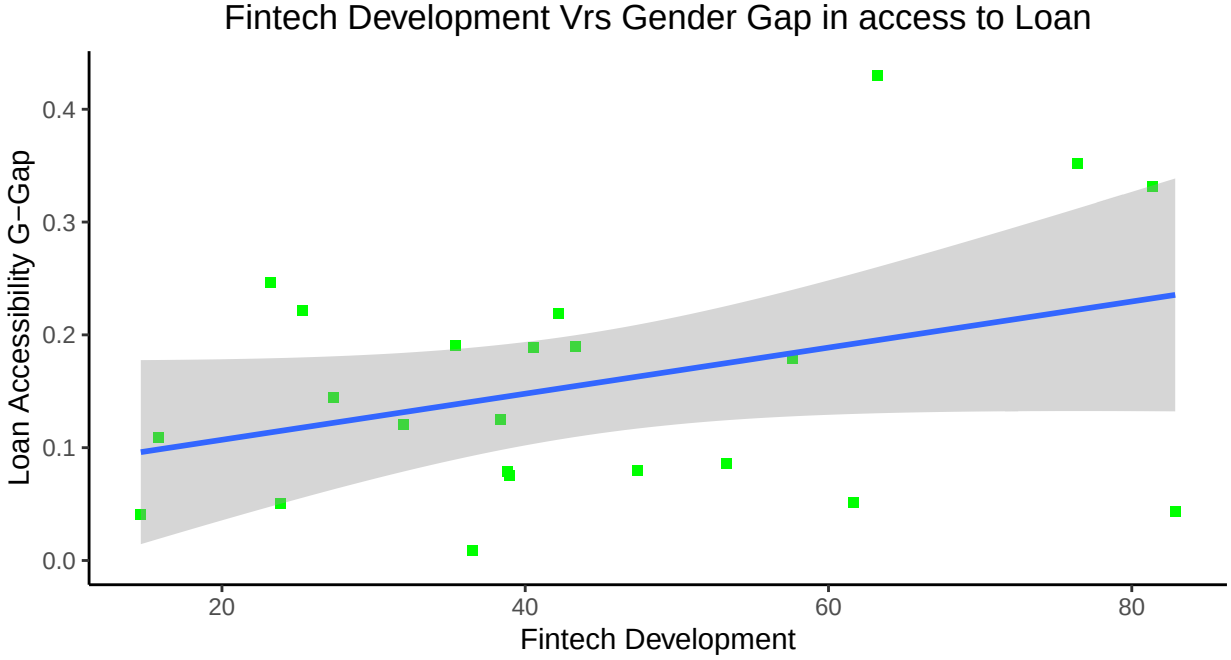


Fig.16: Scatter plot showing the relationship between Fintech development and gender gap in accessibility of loan from a formal financial institution in SSA.
Source: Author, based on data from Global Findex database (2021) and World bank's WDI (2023)

3.7. Population growth by Gender

Since the denominator for the proportion of both males and females with access to financial services is the number of males and females aged 15+ respectively, the study investigated the magnitude of the difference in the growth of the population for both groups. This was done to better understand if the difference in proportions could also be explained by the difference in population in both groups. Upon investigating this, it is shown in Fig17 and Fig18 that the proportion of males and females aged 15 and above have had almost similar growth rates over the periods of study. In Fig19, the male proportion and female proportion for each country in the year 2021 was displayed together to observe the magnitude of the difference between the groups. The plot showed that although all the countries had more females than males, the difference between the proportions is fairly below 5% for all the countries with Zimbabwe recording the highest of about 4%. This suggests that population difference could not neccessarily be the reason for the gender disparity in terms of access to financial services, which is referred to as financial inclusion gender gap.

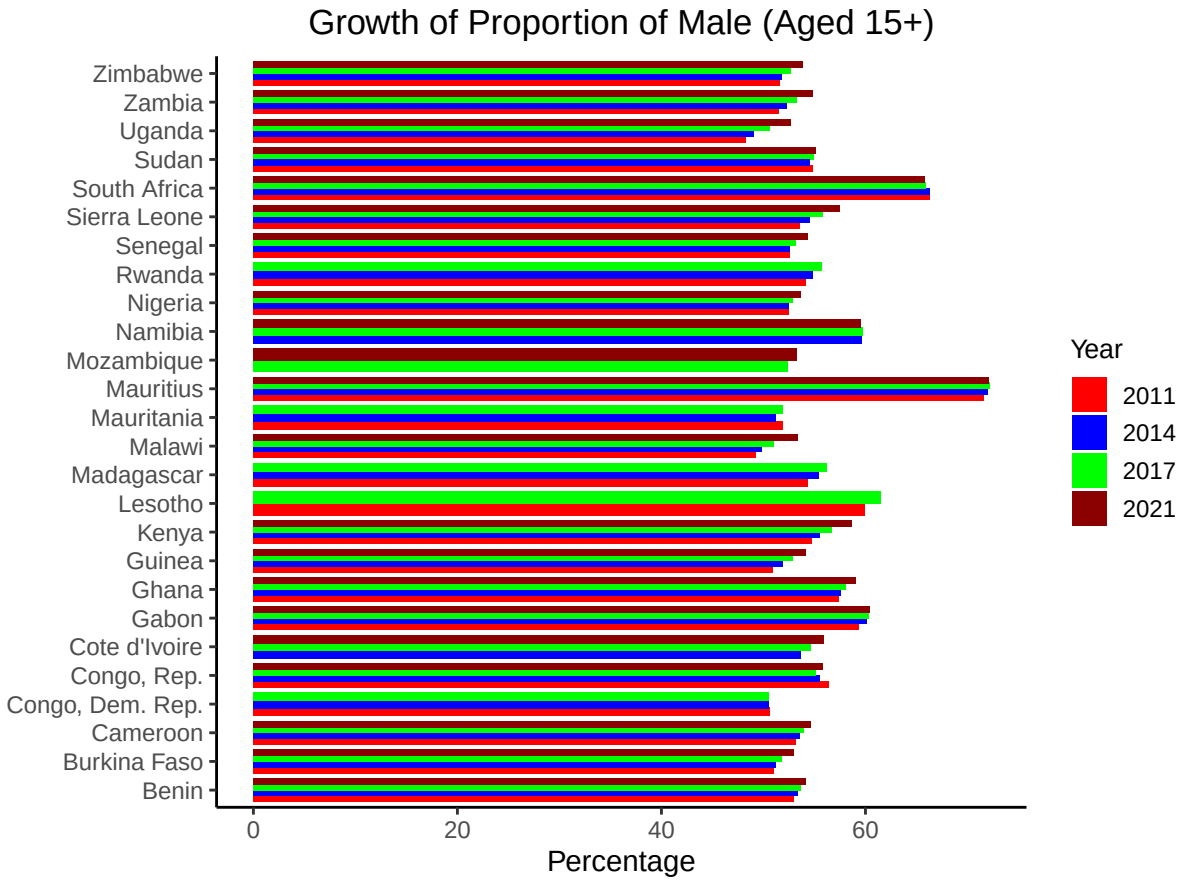


Fig.17: The proportion of adult males out of the total male population in SSA countries (2011−2021).
Source: Author based on data from the World Bank WDI, 2023

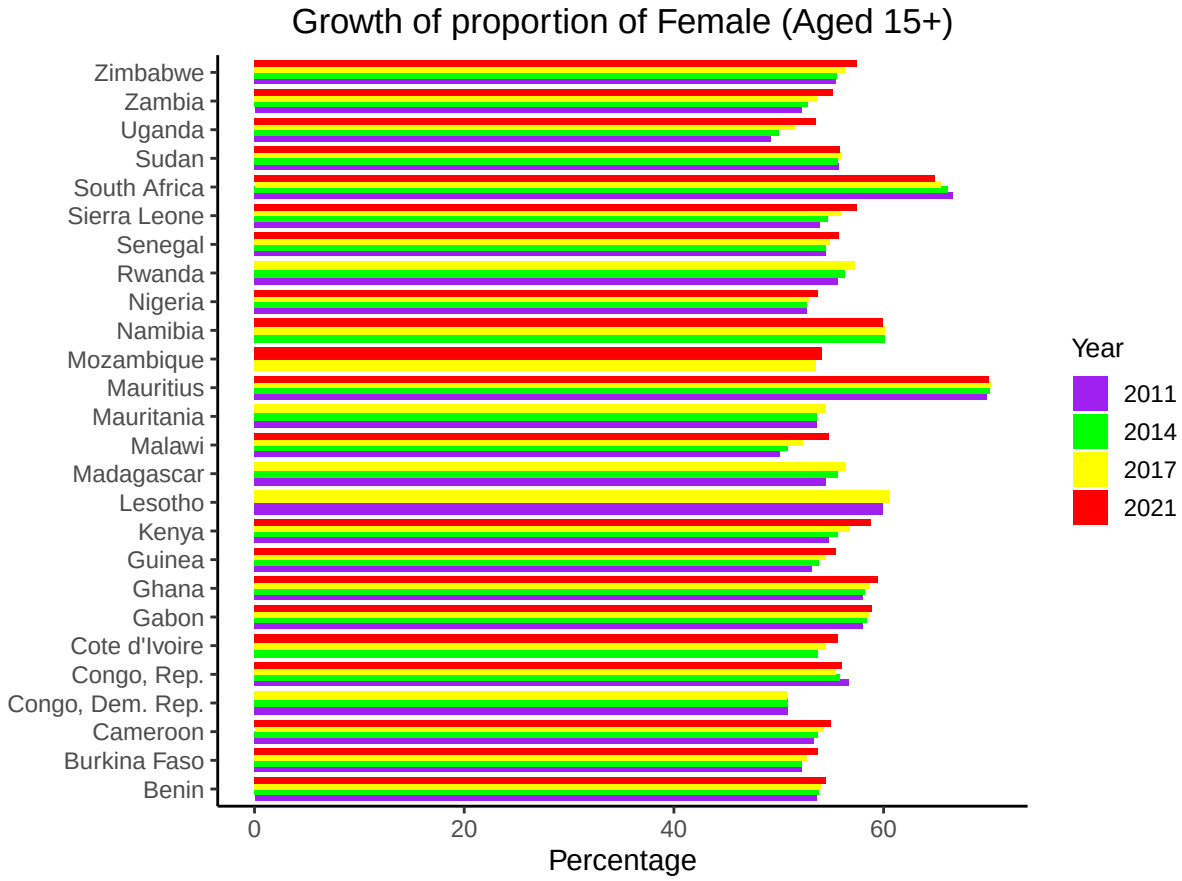
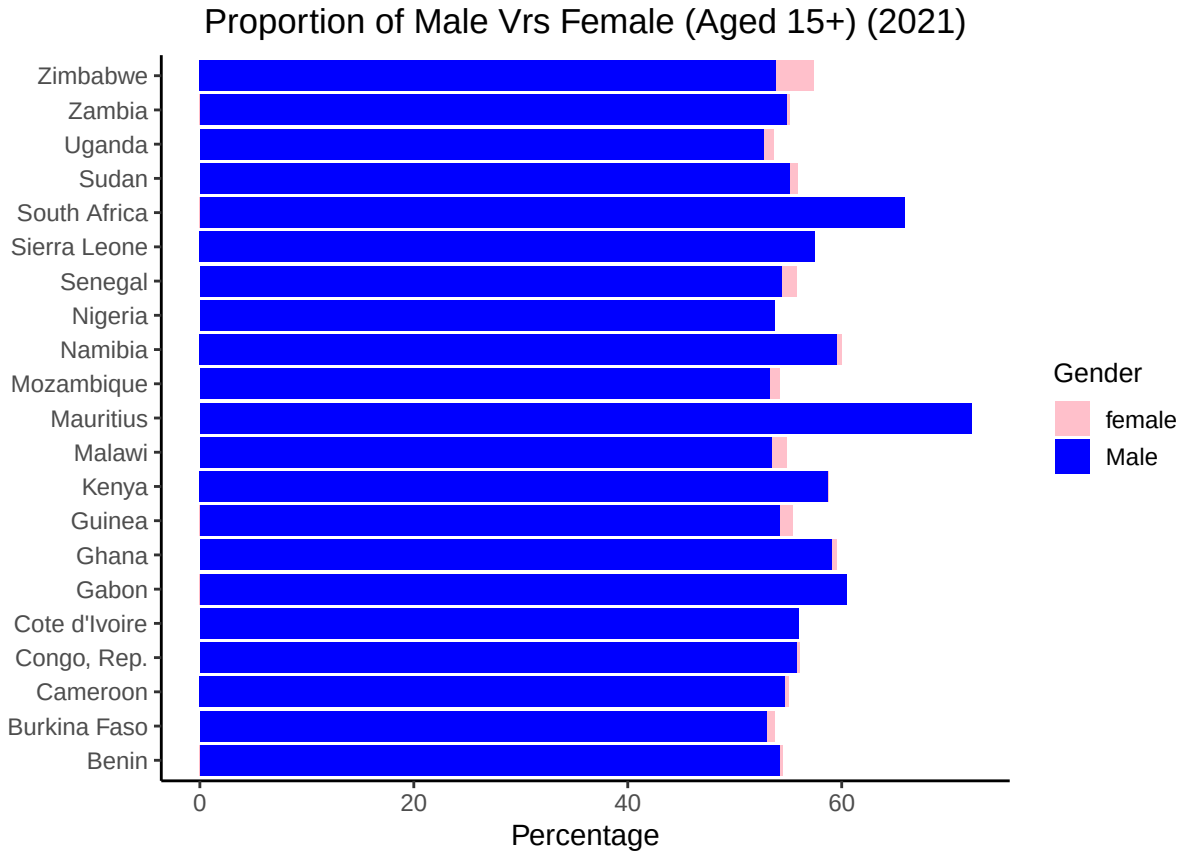


Fig.18: The proportion of adult females out of the total female population in SSA countries (2011−2021).
Source: Author based on data from the World Bank WDI, 2023



The proportion of adult males out of the total male population Vrs the proportion of adult females out of the total female population in 2021. Source: Author based on data from the World Bank WDI, 2023

4. CONCLUSION

Notwithstanding the present limited developments in Fintech, there is cause for optimism regarding the potential for future expansion and influence. With the growing recognition and interest in digital financial services, coupled with technological advancements and increased investment in this domain, Sub-Saharan African countries (SSA) possess the capacity to surpass conventional banking models by adopting inventive Fintech solutions that address the distinct requirements and inclinations of their populace.

In light of the pivotal significance that Fintech possesses in fostering economic expansion, financial inclusion, and digital revolution, it is imperative to accord top priority to the establishment of resilient Fintech ecosystems in Sub-Saharan African nations. This entails addressing broader ecosystem enablers, including but not limited to supportive regulatory frameworks, access to funding and venture capital, digital literacy and skills development, and partnerships among governments, financial institutions, technology firms, and other stakeholders, in addition to fostering technological innovation. In brief, although the results indicate that Fintech progress in Sub-Saharan African nations is presently limited, they also emphasize the tremendous potential that Fintech has to facilitate inclusive economic expansion, enhance financial accessibility, and enable both individuals and enterprises throughout the area—given that the requisite conditions and support systems are established. Emphasizing the importance of fostering an environment conducive to Fintech development to reduce gender inequalities in financial access. This may involve supporting regulatory frameworks that promote innovation and ensuring that Fintech solutions are accessible and tailored to the needs of marginalised populations, including women.

It must be noted that this analysis is made solely based on data from the 26 Sub-Saharan African countries and the visualizations produced in the study, thus, generalization of findings must be done with caution. Further empirical analysis would b required to provide sufficient evidence and explanation to the study concept.

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