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**African Women Vulnerability Index: Focus on Rural Women**

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**Vanessa S. Tchamyou**
Association for the Promotion of Women in Research and Development in Africa (ASPROWORDA), Cameroon.
E-mails:simenvanessa@asproworda.org / simenvanessa@yahoo.com

**Samba Diop**
Faculty of Economics and Management, P.O. Box, 30, Alioune Diop University, Bambey, Senegal
E-mail: diopapasamba@gmail.com

**Simplice A. Asongu**
School of Economics, University of Johannesburg, Johannesburg, South Africa.
E-mails: asongusimplice@asproworda.org / asongusimplice@yahoo.com

**Joseph Nnanna**
The Development Bank of Nigeria, The Clan Place, Plot 1386A Tigris Crescent, Maitama, Abuja, Nigeria
E-mail:jnnanna@devbankng.com

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# African Women Vulnerability Index: Focus on Rural Women

**Vanessa S. Tchamyou, Samba Diop, Simplice A. Asongu & Joseph Nnanna**

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## Abstract

In this paper, we develop a new index labelled the African Women Vulnerability Index (AWVI) with a focus on rural women using Round 7 of the Afrobarometer Survey. The AWVI comprises 59 indicators in six dimensions namely: safety, empowerment, health, education, economic prosperity and digitalisation. Our findings show that: (i) Botswana performs best while women in Guinea and Sudan are the most vulnerable. Indeed, Mauritius appears as a good example in some dimensions such as health and digitalisation. (ii) Except for the dimension of digitalisation, rural women's vulnerabilities in other dimensions are very close to those at the national level. (iii) National vulnerability trends strongly explain rural women's vulnerability especially for the economic, empowerment and health dimensions.

*Keywords:* Index creation, gender, rural analysis, Africa

*JEL Codes:* C43, O18, O55.

## 1. Introduction

The concern about gender exclusion has been extensively investigated in the existing literature. The main orientation in Africa is gender inequality. While women and men are born with the same rights to safety as well as access to social, health and education services, the reality shows that inequalities in access to the underlying services are still visible (ILO, 2011; African Union Commission, 2015). This reality is widely apparent in the context of Africa. The debate relative to gender has resurfaced for many reasons.

First, Goal 5 of the United Nations 2030 project for sustainable development is oriented towards the achievement of the objective of gender equality and empowerment: *"Target 5.5: Ensure women's full and effective participation and equal opportunities for leadership at all levels of decisionmaking in political, economic and public life"* (SDSN, 2021). Moreover, Agenda 2063 of the African Union (AU) allocates an important weight to equality between women and men in order to attain sustainable development (African Union Commission, 2015)[1].

Secondly, the literature on gender has shown that promoting gender equality and women economic empowerment will positively affect global economic activity (Abney & Laya, 2018; Asongu & Odhiambo, 2020a). Hence, according to the ILO (2011), reducing the gender gap in employment would generate an additional US$1.6 trillion in output. Regarding sub-Saharan Africa, the gender gap reduction leads to a 0.2% increase in gross domestic product (GDP) growth. Reducing the gap in labour force participation rates between women and men by 25% by the year 2025 could raise GDP by 3.9% or US$5.8 trillion. ActionAid International (2015) estimates thatif gender gaps in employment and wages were closed, African women could gain an additional US$0.7 trillion. It is worthwhile to note that, beyond the concern of gender equality, equality in the strict sense is important not only because it produces growth, but also because it is valuable in itself, as a manifestation of social justice and human development.

To date and to the best of our knowledge, the literature on women's vulnerability and especially in African countries is very sparse. Here, women that we consider "vulnerable" are

[1] It is important to note that Agenda 2063 represents a blueprint for the transformation of Africa into a global competitive powerhouse for the future. Accordingly, it is the strategic framework of the continent with the ambition of sustainable and inclusive development that is consistent with the pan-African objectives of freedom, unity, progress, self-determination and collective prosperity.

those that are neglected by the society, by their partners and are exposed to social pressures. Indeed, in this paper, we define several kinds of vulnerabilities (health, education, digitalisation, empowerment, safety and economic). For example, in the context of health, vulnerability affects access to the utilisation of health services while in the context of digitalisation, it affects access to information and communication technologies (ICTs) such as the internet. The existing studies are globally oriented towards gender inequality (Gender Inequality Index (GII) of the United Nations Development Program (UNDP), the World Economic Forum's Global Gender Gap Index, among others). Currently an African Gender Index (AGI) is jointly developed by African Development Bank Group and the United Nations Economic Commission for Africa (Africa Gender, 2020). The objective of this index is to calculate the inequality between women and men. The AGI is composed of three dimensions (economic, social and empowerment). Accordingly, the AGI is used to calculate the inequality between women and men, and is composed of three dimensions: the economic, the social, and the empowerment dimensions. Contrary to the gender parity index or gender inequality index, we assess the current situation of women both in urban and rural areas in relation to access affordability, the quality of infrastructures and government services, such as education, health, digitalisation safety, *inter alia*. Hence, we are not interested in a comparison of women and men or a ratio of female to male values including parity by socioeconomic characteristics (empowerment, health, education, labour, *inter alia*.).

The index we develop in this paper differs from the existing indexes in different ways. Firstly, it is constructed by proportion from individual level data of the Afrobarometer survey in 34 African countries. Secondly, unlike standard indexes of inequality, our index evaluates vulnerability and the exposure of women to safety, empowerment, health, education, economic prosperity and digitalisation. This approach allows us to assess the exposure of women as opposed to inequality. Finally, to extend the existing literature, we are interested specifically in the vulnerability ofrural women. This strategy is justified by the fact that women's vulnerability depends on place and context. Also, rural women play an important role in productivity and food security. For instance, according to the FAO (2011), if female farmers were given the same access to resources as men, their agricultural production could rise by 20% to 30%, the national agriculture yields could increase by 2.5% to 4% while the number of hungry people could be reduced by 12% to 17%. However, rural women have less access to land control than rural men (Aguilar *et al*., 2014; Asongu & Odhiambo, 2020b; Uduji *et al*., 2020, 2021).

The objectives of the paper are threefold. First, we construct an index to rank African countries in terms of women's vulnerability with respect to different dimensions such as safety, empowerment, health, education, economic prosperity and digitalisation. Second, specific emphasis is placed on the vulnerability of rural women. Finally, we examine whether, the national vulnerability of women reflects the vulnerability of rural women. In other words, the third objective allows us to evaluate whether compared to urban women, more efforts should be placed in promoting rural women in order to improve their socio-economic conditions. The creation of the new women vulnerability index is important for several reasons. Firstly, to achieve the African Union's Agenda 2063 of sustainable development, we need to understand the level of women's vulnerability in every African country as well as detect where efforts have to be made. Secondly, the index brings together indicators showing vulnerabilities in safety, education, economic situation, empowerment, health and digitalization.

Thirdly, this index provides a useful tool not only for a panoramic view of women's vulnerability but also for both researchers and policy makers to synthesize and monitor the process towards Agenda 2063 and Goal 5 of the United Nations' 2030 project for sustainable development. Indeed, we focus on rural areas because specifying the vulnerability of rural women allows us to evaluate if national vulnerability explains rural vulnerability in African countries. The underlying reasons are consistent with the South African Women's Charter (1994) which argues that: "*At the heart of women's marginalisation is the patriarchal order that confines women to the domestic arena and reserves for men the arena where political power and authority reside. Conventionally, democracy and human rights have been defined and interpreted in terms of men s experiences. Society has been organised and its institutions structured for the primary benefit of men*" (Horn, 1994, p. 37).

The rest of the study is structured as follows. The construction of the index is provided in Section 2 with emphasis on the theoretical framework and data presentation, data normalization and insights into weighting and aggregating. The empirical results and corresponding discussed are provided in Section 3 while the robustness checks are covered in Section 4. Section 5 concludes with implications and future research directions.

## 2. The African Women Vulnerability Index (AWVI) construction

### 2.1. Theoretical framework and data presentation

According to a handbook on constructing composite indicators, the most important and problematic steps include the justification of the theoretical framework, the definition of dimensions, and the selection of variables (OECD & Joint Research Centre, 2008; Diop *et al.*, 2021). For Park and Claveria (2018), the theoretical framework represents the starting point of the composite indicator we need. In this study, the underpinnings of gender inequality and vulnerability discussed in the introduction constitute the theoretical foundation. We identify different vulnerabilities that African women face every day. Hence, we attempt to describe the vulnerabilities across different dimensions.

When constructing an index, the theoretical framework which justifies the selection of data is an important step because it is the cornerstone on which the index construction is based. In this paper, the selection of the indicators is guided by the literature on gender vulnerability index. For example, the African Gender Index (2019) of the African Union uses: (i) labour, access to resources and management as sub-components of the economic dimension; (ii) education and health as components of the social dimension and (iii) female and male shares on national parliaments, ministerial positions, land and house ownership, females in top management, managers, professionals and technicians to define the dimension of representation and decision making. Indeed, the United Nations Development Programme (UNDP) publishes two indices annually. The first is the Gender Inequality Index with three dimensions. The health dimension entails the maternal mortality ratio and adolescent birth rate. The empowerment dimension includes female population with at least secondary education, female shares of parliament seats while the labour market dimension consists of female labour force participation rates. The second index calculated by the UNDP measures the Gender Development inequality in the context of human development. The dimensions are health (measured by female and male life expectancy at birth), education (measured by expected years of schooling and female and male mean years of schooling for adult ages 25 years and older) and economic resources (measured by female and male estimated earned income). Another index of gender vulnerability is calculated by the International Plan in India. The index includes poverty (measured by 19 indicators), protection (26 indicators), education (68 indicators) and health (57 indicators).[2]

[2] For more details on the 170 indicators, see https://smartnet.niua.org/sites/default/files/resources/gender-vulnerability-index.pdf

To compute our index, we employ the dataset of the Afrobarometer. More precisely, we use Round 7 surveys of the dataset which includes 45823 interviews completed in 34 countries between September 2016 and September 2018. It is worthwhile to note that the survey is handled in a comparative analysis of public attitude. It evaluates the attitude of citizens towards aspects such as democracy and governance, civil society and markets, *inter alia*.
We can justify the choice of the Round 7 dataset survey on many fronts. Firstly, a special module on gender equality is carried out in the dataset, thus allowing us to directly detect responses about vulnerabilities. Secondly, the vulnerability of women could be appreciated as a personal status, and such information cannot easily be captured by secondary or macro level data. Fortunately, the Afrobarometer conducts face-to-face interviews in the language proposed by the respondent. Finally, it is a comprehensive survey covering most of African countries and freely available. Table 1presents the sample characteristics and Table 2 the sample size by country and the proportion of male and female. It appears there is equilibrium between males and females while the sample is dominated slightly by the rural population.

In Table 3, we describe the chosen indicators and their labels in order to understand the reference responses. The African Women Vulnerability Index (AWVI) has six dimensions (safety, empowerment, health, education, economic prosperity and digitalisation). The safety dimension assesses how women are vulnerable about their treatment both physically and psychologically. Seventeen indicators are included in this dimension. The empowerment dimension measures how African women are independent in their actions and whether they participate in society's decision-making process. Eleven indicators are in this dimension. For the health dimension, we have ten variables corresponding to the evaluation of women's social and health status. The education dimension assesses how women face problems of school services access and inequality in accessing educational opportunities. Six variables are included in this dimension. Regarding the economic dimension, seven indicators are selected. Within this dimension, we attempt to evaluate African women's vulnerabilities in the labour market, income and economic well-being. Finally, the digitalisation dimension (consisting of eight indicators) measures the level access to new technologies such as internet and bank services.

To construct our AWVI, we are only interested in women's responses to the interviews. The data are constituted by the proportion of women who are in a favourable situation according

to the different questions. As is apparent in Table 3 on data description, we take the favourable response as the reference. So, all the data have a negative impact on vulnerability exposure. Here, the term favourable response refers to the proportion of the women who are in a privileged position regarding the question asked. For example, regarding the "Q89e. Own bank account", question, a value of 0.3 indicates that 30% of women have their own bank accounts against 70% who do not hold such bank accounts. Hence, the higher the value of the indicator, the better the country's performance. In effect, we calculated a vulnerability index based on the proportion (i.e.in % of women) that has access to education, safety, health, ICTs, bank services, *inter alia*. Thus, the more the proportion is low, the more women in the country (national or rural) are vulnerable.

### 2.2. **Data normalisation**

There is a vast literature on data normalization methods among which we can mention Min-Max, ranking, Z-score, SoftMax, distance to a reference, *inter alia* (OECD & Joint Research Centre, 2008; Diop *et al*., 2021). Each of these methods has its advantages and disadvantages but the results obtained are usually close, *ceteris paribus*. In this study, we use the well-known min-max method which is one of the most famous ways to normalize data (Diop & Asongu, 2020). It provides value scaled into the range $[0,1]$ where the minimum index and the maximum index are 0 to 1, respectively. One of the drawbacks of the method is that the presence of outliers could bias the results. Since we use proportions and therefore the same data measurement units, the probability that this event occurs is weak. The min-max transformation is given as follows:

$$I_{qc} = \frac{x_{qc} - min_c(x_q)}{max_c(x_q) - min_c(x_q)}$$

Where $x_{qc}$ is the value of indicator $q$ for country *c*. The minimum and the maximum values for each indicator are calculated across different countries. 34 of the 54 African countries are sampled for the period 2016 to 2018 because of data availability constraints at the time of the study. The data are from the latest round of the Afrobarometer Survey, notably: Round 7-2016/2018. Accordingly, the focus is exclusively on 34 African countries because the Afrobarometer Round 7 survey, from which indicators are borrowed, consists of individual interviews in 34 countries. Data are collected for both opinions and perceptions of individuals around land-related issues including women's land rights. Since we are in the presence of cross section data, there is a limitation caused by the absence of the time dimension because

this structure does not allow us to identify the different changes over time. Hence, without a panel dimension, it is not possible to take into account the evolution of the index over time. We can note that the Afrobarometer is collecting information for the next round (i.e. Round 8) and it should be interesting to compute the same indexes with these data in order to assess changes over time. The sampled countries are disclosed in Table 6 of the Appendix.

### 2.3. **Weighting and aggregating**

In the existing literature on gender inequality and vulnerability, most of the studies previously discussed have used classical methods such as arithmetic or geometric means (Africa Gender, 2020). These methods of weighting and aggregating are criticized in statistical tools for index creation. Accordingly, they are sensitive to extreme values and are robust only if all values are equally important. In our paper, we use a multivariate data analysis technique for data aggregation. More specifically, we employ the principal component analysis (PCA) which best works mostly when the variables are not equally important (Tchamyou, 2017). It is used with the objective to reduce the number of variables by elucidating the observed variance of data via the linear relation of the original data. Loadings obtained from the PCA are used to compute the different weights instead of giving the same weight to all variables as it is with the arithmetic or geometric methods (Tchamyou *et al*., 2019). In the first step, we run the PCA on the variables in each of the six dimensions as presented in the tables in order to derive alternative weights. Once the weights are obtained, we again employ the PCA to the six sub-indexes that are weighted to compile the AWVI.

## 3. **Results and discussion**

Before interpreting the vulnerability scores, we first evaluate the results of the PCA for the selection of the number of component factors in order to determine the different weights. We use the Kaiser criterion which drops all factors with eigenvalues below 1, consistent with contemporary literature (Abdi & Williams, 2010; Asongu & Tchamyou, 2019; Diop *et al*., 2021; Diop &Asongu, 2020). The results ofthe PCA, loadings and weights are presented in Table 4 and Table 5 for vulnerability at the national level and the rural population, respectively. For national and rural women vulnerabilities, we note different weights for all indicators mostly for the empowerment dimension and the composite index. This result confirms that classical methods of weighting and aggregating (arithmetic, geometric and harmonic means) are not robust in the construction of indexes in this field.

Table 6 presents the descriptive statistics of the indexes and their sub-dimensions. The scores range from 0 (worst score) to 1 (best score). For vulnerability at the national level, the composite index ranges from 0.273 to 0.848 with a mean of 0.503. On average, a higher score is obtained from the empowerment dimension (0.508) while the lowest performance is noted on health dimension. The most volatile dimension is digitalisation where the value ranges from 0.069 to 0.986. Regarding the rural RWVI, the composite index is apparent in the scale of 0.146 to 0.787, with a mean of 0.455 indicating that the performance decreases by 4.8 points in the rural population compared to the National Women Vulnerability Index (NWVI). We also note the lowest performance of the digitalisation vulnerability (0.355) which is characterised by a high spread (0.220 to 0.998). On average, with the exception of digitalisation for which vulnerability decreases by 10 points compared to the NWVI, there is a marginal gap between the two composite indexes.

### 3.1. **National Women Vulnerability Index (NWVI)**

Now we are interested in the vulnerability at the national level and its ranking for all countries. The results are presented in Table 7. The index scores are scaled from 0 to 1 and the closer the value is to 0, the poorer is the performance and vice versa. Since we have 34 countries, the ranking is from 1 (best country's performance) to 34 (worst country's performance). The NWVI reveals Botswana as the country where women are least vulnerable. Botswana earns a score of 0.848 and also ranks 1$^{st}$ in terms of safety (0.650) and education (0.688), 2$^{nd}$ (0.668) and 3$^{rd}$ in health and empowerment, respectively. It is worthwhile to note that in the economic dimension, this country takes the modest 11$^{th}$ place with a score of 0.485. Botswana is followed by Namibia (2$^{nd}$), Gambia (3$^{rd}$), Ghana (4$^{th}$) and Mauritius (5$^{th}$). Another key fact is that Mauritius ranks first in two dimensions (health (0.703) and digitalisation (0.986)). Sudanese women are the most vulnerable (0.273) even if the country performs well in digitalisation (8$^{th}$).

### 3.2. **Rural Women Vulnerability Index (RWVI)**

Table 8 presents the index scores only for the population of rural women. Once more, Botswana has the best score for the composite index (0.787). Namibia always keeps the 2$^{nd}$ place with a score of 0.730. Mauritius takes the 3$^{rd}$ place from Gambia which is now ranked 10$^{th}$. Ghana continues to maintain the same rank (4$^{th}$) as for the NWVI. Rural women in

Guinea are the most vulnerable in Africa behind Morocco and Sudan, respectively. For the economic dimension, Ghana performs best (0.736) while Mauritius ranks best for health (0.717) and digitalisation (0.998). For education, Sao Tome and Principe is the top performer with a score of 0.613.

### 3.3. **Comparative analysis between NWVI and RWVI**

After evaluating the NWVI and the RWVI, we can now focus our analysis on the comparison between the two indexes already created. It is apparent from the descriptive statistics that on average, when the two composite indexes are considered, at the national level, the score is 0.503 while it corresponds to 0.455 in the rural context, showing a decrease of 4.8 points. However, the digitalisation dimension decreases substantially. In effect, digitalisation vulnerabilities decrease by 10 points (0.455 in the national index and 0.355 regarding the rural index). For a better view of the relationship between the indexes, a graph is used for illustration. Graph 1 confirms the strong relationships between the two indexes and their sub-dimensions. It appears that the national trend of women's vulnerabilities strongly explains rural women's vulnerabilities especially for the economic, empowerment and health dimensions.

It is also important to emphasize that while much difference is not apparent between the rural and the national index with the exception of the digitalization dimension, assessing the vulnerability index in the rural area is interesting for the study for a multitude of reasons. Firstly, to our knowledge, the existing literature has only focused on national vulnerability while women in rural areas are expected to be more exposed. Secondly, as we note in the introduction, rural women play an important role is some sectors such as food security, productivity, *inter alia*. Finally, specifying rural women vulnerability allows us to evaluate if national vulnerability explains rural vulnerability in African countries.

## 4. **Robustness checks**

For robustness checks and sensitivity analysis, we make two changes. We first consider an alternative method for normalization. In place of the Min-Max approach, a SoftMax method is employed. Secondly, we replace the PCA for weighting and aggregating by a geometric mean of aggregation. This method is used for the African Gender index (Africa Gender, 2020). The results are presented in Table 9. The findings show that the indexes have not changed much on average, indicating that the results are robust to the use of alternative

methods of normalization, weighting and aggregating. It is also worthwhile to emphasize that while only descriptive statistics with alternative methodologies are provided in this robustness check section owing to a word count constraint, the results are nonetheless robust in terms of country rankings.

## 5. Conclusion and future research directions

In this paper, we have created women's vulnerability index in African countries. Departing from the existing indexes (such as, among others, AGI, GII), we have used data from the Afrobarometer Round 7 surveys where indicators are individual interviews in 34 countries. This option has the advantage of taking into account the personal status of women's vulnerabilities. In a second step, we focused on rural women by creating a rural women vulnerability index (RWVI).

The results can be summarized as follows. Firstly, both for national and rural indexes, Botswana is the best ranked. It is followed by countries such as Namibia, Mauritius and Ghana. Indeed, Mauritius ranks first in the health and digitalisation dimensions. Secondly, on average, with the exception of the digitalisation dimension where there is a significant difference in the scores between national and rural vulnerability indexes, rural women's vulnerabilities in other dimensions are very close to those at the national level. Finally, the findings show that the national trend of women's vulnerabilities strongly explains rural women's vulnerability especially for the economic, empowerment and health dimensions.

The established findings in this study obviously leave room for future research especially as it pertains to employing the indexes to assess issues surrounding sustainable development goals (SDGs). It is important to note that, this study focuses on the fifth sustainable development goal (SDG) concerned with the promotion of gender quality (i.e. SDG5) as apparent in the second paragraph of the introduction. Moreover, while some other SDGs could be highlighted in the indicators, the perspective that these measurements are skewed towards the female gender implies that SDG5 is still the focus of the study.

It is also worthwhile to clarify that the definition of the concept of "vulnerable" as employed in this study "i.e. women that are neglected by the society, by their partners and are exposed to social pressures", can be improved in the light of Gilson (2016). Hence, in future research, a nuanced definition is needed that incorporates the systemic nature of social reproduction

and production systems of how society is organized. Accordingly, it is possible that while women could have less access to health care, the health care itself could be of poor quality and by extension, clarification is needed as to whether, women are not utilizing the services because they are poor, or because they are vulnerable and thus unable to access the services.

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## Appendices

**Table 1: Sample characteristics**

| | | Weighted | Unweighted |
|---|---|---|---|
| Gender | Male | 49.90% | 49.90% |
| | Female | 50.00% | 50.10% |
| | Missing | 0.00% | 0.00% |
| Location | Urban | 42.80% | 43.30% |
| | Rural | 55.50% | 55.20% |
| | Semi-urban | 1.60% | 1.40% |
| | Peri-urban | 0.10% | 0.10% |

Source: Authors' calculation on data from Round 7 Afrobarometer Survey

Table 2: Sample size by country and proportion of male and female

| Country | #Observations | Male | Female |
|---|---|---|---|
| Benin | 1200 | 0.500 | 0.500 |
| Botswana | 1200 | 0.500 | 0.500 |
| Burkina Faso | 1200 | 0.498 | 0.502 |
| Cabo Verde | 1200 | 0.495 | 0.505 |
| Cameroon | 1202 | 0.502 | 0.498 |
| Cote d'Ivoire | 1200 | 0.500 | 0.500 |
| Eswatini | 1200 | 0.498 | 0.502 |
| Gabon | 1200 | 0.499 | 0.501 |
| Gambia | 1200 | 0.500 | 0.500 |
| Ghana | 2400 | 0.498 | 0.502 |
| Guinea | 1194 | 0.500 | 0.500 |
| Kenya | 1599 | 0.500 | 0.500 |
| Lesotho | 1200 | 0.500 | 0.500 |
| Liberia | 1200 | 0.500 | 0.500 |
| Madagascar | 1200 | 0.499 | 0.501 |
| Malawi | 1200 | 0.499 | 0.501 |
| Mali | 1200 | 0.500 | 0.500 |
| Mauritius | 1200 | 0.500 | 0.500 |
| Morocco | 1200 | 0.502 | 0.498 |
| Mozambique | 2392 | 0.597 | 0.493 |
| Namibia | 1200 | 0.495 | 0.505 |
| Niger | 1200 | 0.499 | 0.501 |
| Nigeria | 1600 | 0.501 | 0.499 |
| Sao Tome P | 1200 | 0.497 | 0.503 |
| Senegal | 1200 | 0.497 | 0.503 |
| Sierra Leone | 1200 | 0.499 | 0.501 |
| South Africa | 1840 | 0.500 | 0.500 |

| | | | |
|---|---|---|---|
| Sudan | 1200 | 0.499 | 0.501 |
| Tanzania | 2400 | 0.500 | 0.500 |
| Togo | 1200 | 0.500 | 0.500 |
| Tunisia | 1199 | 0.499 | 0.500 |
| Uganda | 1200 | 0.500 | 0.500 |
| Zambia | 1200 | 0.500 | 0.500 |
| Zimbabwe | 1200 | 0.497 | 0.503 |

Sources : authors, Male is the proportion of male and Female the proportion of female

**Table 3: Description of dimensions and indicators**

| | Indicators | Labels |
|---|---|---|
| Safety | Q86a. Experienced discrimination based on gender | 0=Never |
| | Q78b. Justified for men to beat their wives | 1=Never justified |
| | Q66. Difficulty to move across borders | 4=Very easy |
| | Q60d. Feared violence by extremists | 0=No, never, |
| | Q60a. Feared violence in neighbourhood | 0=No, never |
| | Q57g. Better or worse: equal opportunities and treatment for women | 4=Better |
| | Q57b. Better or worse: personal safety | 4=Better |
| | Q56q. Handling promoting equal rights/opportunities for women | 4=Very well |
| | Q51. Treatment by public officials compared to others | 3=Better |
| | Q50. Respected by public officials | 3=A lot |
| | Q49p. Difficulty to obtain police assistance | 1=Very easy |
| | Q43g. Trust police | 3=A lot |
| | Q40. How much fear political intimidation or violence | 3=Not at all |
| | Q14. Freedom to say what you think about the society's functioning | 4=Completely free |
| | Q11b. Have been physically attacked | 0=No |
| | Q11a. Had something stolen from your house | 0=No |
| | Q10a. How often felt unsafe walking in neighbourhood | 0=Never |
| Empowerment | Q77d. Women and men have equal chance to own/inherit land | 1=Strongly |
| | Q95c. Who decides how money is used | 1=You make the decisions yourself |
| | Q38f. Better if woman takes care of household | 5=Strongly agree |
| | Q38e. Women have equal right to land | 5=Strongly agree |
| | Q38d. Men have more right to job | 1=Strongly disagree |
| | Q20b. Member of voluntary association or community group | 2=Active member |
| | Q19b. Better or worse: freedom to join political organizations | 5=Much more freedom |
| | Q19a. Better or worse: freedom to give your opinion about politics | 5=Much more freedom |
| | Q18b. Access to information: land ownership | 3=Very likely |

| | | |
|---|---|---|
| | Q16. Men only as leaders vs. women leaders | 4=Agree very strongly with Statement 2* |
| | Q9. How dependent on receiving remittances | 0=Not at all |
| Health | Q92b. Location of toilet or latrine | 1=Inside the house |
| | Q57a. Better or worse: access to medical care | 4=Better |
| | Q56j. Handling ensuring enough to eat | 4=Very well |
| | Q56i. Handling providing water and sanitation services | 4=Very well |
| | Q56g. Handling improving basic health services | 4=Very well |
| | Q49g. Pay bribe for medical care | 0=Never |
| | Q49e. Difficulty to obtain medical treatment | 1=Easy |
| | Q8c. How often gone without medical care | 0=Never |
| | Q8b. How often gone without water | 0=Never |
| | Q8a. How often gone without food | 0=Never |
| Education | Q97. Education of respondent | 5=Secondary school / high school completed |
| | Q77a. Girls and boys have equal chance at education | 4=Agree, 5=Strongly agree |
| | Q57c. Better or worse: government effectiveness on education | 4=Better |
| | Q56h. Handling addressing educational needs | 4=Very well |
| | Q49c. Pay bribe for public school services | 0=Never |
| | Q49b. Difficulty to obtain public school services | 1=Very easy |
| Economic | Q94. Employment status | 3=Yes, full time |
| | Q77c. Women and men have equal chance of paying job | 4=Agree, 5=Strongly agree |
| | Q77b. Women and men have equal chance to earn income | 4=Agree, 5=Strongly agree |
| | Q8d. How often gone without cooking fuel | 0=Never |
| | Q5. Your living conditions vs. others | 4=Better |
| | Q4B. Your present living conditions | 5=Very good |
| | Q4A. Country's present economic condition | 5=Very good |
| Digitalisation | Q93. Electric connection from mains | 5=All of the time |
| | Q91b. How often use the internet | 4=Every day |
| | Q91a. How often use a mobile phone | 4=Every day |
| | Q90. Mobile phone access to internet | 1=Yes, has Internet access |
| | Q89f. Own mobile phone | 2=Yes, personally owns |
| | Q89e. Own bank account | 2=Yes, personally owns |
| | Q89d. Own computer | 2=Yes, personally owns |
| | Q89b. Own television | 2=Yes, personally owns |

Source: Authors' calculation on data from Round 7 Afrobarometer Survey. Note:* Statement 2: Women should have the same chance of being elected to political office as men.

**Table 4: Principal Component Analysis and weights (National Level)**

| Principle Component Analysis | | | | Squared loadings | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Comp | Egen. Val. | Proportion | Cumulative | Variable | F1 | F2 | F3 | F4 | F5 | Weights |
| Dimension: safety | | | | | | | | | | |
| 1 | 4.225 | 0.248 | 0.248 | Q86a | 0.124 | 0.051 | 0.010 | 0.007 | 0.038 | 0.063 |
| 2 | 2.986 | 0.176 | 0.424 | Q78b | 0.000 | 0.006 | 0.273 | 0.070 | 0.043 | 0.062 |
| 3 | 2.099 | 0.123 | 0.548 | Q66 | 0.071 | 0.045 | 0.001 | 0.000 | 0.031 | 0.040 |
| 4 | 1.367 | 0.080 | 0.628 | Q60d | 0.006 | 0.001 | 0.147 | 0.132 | 0.111 | 0.055 |
| 5 | 1.261 | 0.074 | 0.702 | Q60a | 0.113 | 0.020 | 0.000 | 0.022 | 0.017 | 0.050 |
| 6 | 0.927 | 0.055 | 0.757 | Q57g | 0.099 | 0.104 | 0.003 | 0.013 | 0.041 | 0.068 |
| 7 | 0.851 | 0.050 | 0.807 | Q57b | 0.012 | 0.214 | 0.057 | 0.027 | 0.006 | 0.072 |
| 8 | 0.694 | 0.041 | 0.848 | Q56q | 0.123 | 0.060 | 0.016 | 0.004 | 0.001 | 0.062 |
| 9 | 0.546 | 0.032 | 0.880 | Q51 | 0.000 | 0.075 | 0.219 | 0.007 | 0.000 | 0.058 |
| 10 | 0.464 | 0.027 | 0.907 | Q50 | 0.058 | 0.097 | 0.002 | 0.017 | 0.041 | 0.052 |
| 11 | 0.445 | 0.026 | 0.933 | Q49p | 0.031 | 0.068 | 0.117 | 0.016 | 0.116 | 0.062 |
| 12 | 0.314 | 0.018 | 0.952 | Q43g | 0.007 | 0.115 | 0.039 | 0.102 | 0.003 | 0.050 |
| 13 | 0.299 | 0.018 | 0.969 | Q40 | 0.081 | 0.019 | 0.007 | 0.204 | 0.005 | 0.059 |
| 14 | 0.190 | 0.0112 | 0.981 | Q14 | 0.006 | 0.081 | 0.100 | 0.001 | 0.274 | 0.069 |
| 15 | 0.160 | 0.009 | 0.990 | Q11b | 0.090 | 0.017 | 0.000 | 0.170 | 0.007 | 0.057 |
| 16 | 0.100 | 0.006 | 0.996 | Q11a | 0.120 | 0.006 | 0.007 | 0.009 | 0.083 | 0.055 |
| 17 | 0.068 | 0.004 | 1.000 | Q10a | 0.028 | 0.017 | 0.000 | 0.209 | 0.178 | 0.057 |
| Dimension: empowerment | | | | | | | | | | |
| 1 | 4.139 | 0.376 | 0.376 | Q95c | 0.081 | 0.001 | 0.047 | | | 0.054 |
| 2 | 1.980 | 0.180 | 0.556 | Q38f | 0.023 | 0.162 | 0.028 | | | 0.061 |
| 3 | 1.277 | 0.116 | 0.672 | Q38e | 0.162 | 0.116 | 0.006 | | | 0.122 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 4 | 0.983 | 0.089 | 0.762 | Q38d | 0.147 | 0.002 | 0.000 | 0.083 |
| 5 | 0.818 | 0.074 | 0.836 | Q20b | 0.071 | 0.168 | 0.085 | 0.099 |
| 6 | 0.683 | 0.062 | 0.898 | Q19b | 0.118 | 0.098 | 0.155 | 0.119 |
| 7 | 0.491 | 0.045 | 0.943 | Q19a | 0.088 | 0.149 | 0.158 | 0.116 |
| 8 | 0.295 | 0.027 | 0.970 | Q18b | 0.066 | 0.007 | 0.100 | 0.056 |
| 9 | 0.179 | 0.016 | 0.986 | Q16 | 0.142 | 0.024 | 0.047 | 0.094 |
| 10 | 0.093 | 0.008 | 0.994 | Q9 | 0.002 | 0.158 | 0.363 | 0.107 |
| 11 | 0.061 | 0.005 | 1.000 | Q77d | 0.100 | 0.113 | 0.007 | 0.088 |
| Dimension: Health | | | | | | | | |
| 1 | 2.883 | 0.288 | 0.288 | Q92b | 0.024 | 0.249 | 0.003 | 0.097 |
| 2 | 2.730 | 0.273 | 0.561 | Q57a | 0.153 | 0.003 | 0.099 | 0.085 |
| 3 | 2.193 | 0.220 | 0.781 | Q56j | 0.033 | 0.000 | 0.300 | 0.097 |
| 4 | 0.661 | 0.066 | 0.847 | Q56i | 0.088 | 0.003 | 0.295 | 0.116 |
| 5 | 0.520 | 0.052 | 0.899 | Q56g | 0.151 | 0.056 | 0.114 | 0.107 |
| 6 | 0.916 | 0.039 | 0.938 | Q49g | 0.194 | 0.003 | 0.079 | 0.095 |
| 7 | 0.241 | 0.024 | 0.962 | Q49e | 0.213 | 0.002 | 0.102 | 0.108 |
| 8 | 0.183 | 0.018 | 0.980 | Q8c | 0.074 | 0.226 | 0.000 | 0.107 |
| 9 | 0.122 | 0.012 | 0.992 | Q8b | 0.065 | 0.141 | 0.004 | 0.075 |
| 10 | 0.074 | 0.007 | 1.000 | Q8a | 0.003 | 0.315 | 0.001 | 0.111 |
| Dimension: Education | | | | | | | | |
| 1 | 2.275 | 0.379 | 0.379 | Q97 | 0.007 | 0.157 | 0.476 | 0.161 |
| 2 | 1.475 | 0.246 | 0.625 | Q77a | 0.104 | 0.066 | 0.325 | 0.143 |
| 3 | 1.129 | 0.188 | 0.813 | Q57c | 0.106 | 0.259 | 0.178 | 0.169 |
| 4 | 0.650 | 0.108 | 0.922 | Q56h | 0.004 | 0.511 | 0.012 | 0.159 |
| 5 | 0.384 | 0.064 | 0.986 | Q49c | 0.372 | 0.002 | 0.005 | 0.175 |
| 6 | 0.085 | 0.014 | 1.000 | Q49b | 0.407 | 0.005 | 0.008 | 0.193 |
| Dimension: Economic | | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 2.401 | 0.343 | 0.343 | Q94 | 0.116 | 0.057 | 0.246 | 0.131 |
| 2 | 1.731 | 0.247 | 0.590 | Q77c | 0.292 | 0.064 | 0.120 | 0.177 |
| 3 | 1.420 | 0.203 | 0.793 | Q77b | 0.284 | 0.068 | 0.132 | 0.178 |
| 4 | 0.654 | 0.093 | 0.887 | Q8d | 0.029 | 0.036 | 0.434 | 0.135 |
| 5 | 0.471 | 0.067 | 0.954 | Q5 | 0.007 | 0.318 | 0.022 | 0.108 |
| 6 | 0.312 | 0.044 | 0.998 | Q4B | 0.110 | 0.294 | 0.027 | 0.146 |
| 7 | 0.010 | 0.001 | 1.000 | Q4A | 0.162 | 0.163 | 0.0193 | 0.126 |
| Dimension: Digitalisation | | | | | | | | |
| 1 | 5.439 | 0.777 | 0.777 | Q93 | 0.124 | | | 0.124 |
| 2 | 0.704 | 0.101 | 0.878 | Q91b | 0.163 | | | 0.163 |
| 3 | 0.419 | 0.060 | 0.938 | Q91a | 0.122 | | | 0.122 |
| 4 | 0.253 | 0.036 | 0.974 | Q90 | 0.166 | | | 0.166 |
| 5 | 0.078 | 0.011 | 0.985 | Q89f | 0.143 | | | 0.143 |
| 6 | 0.074 | 0.011 | 0.996 | Q89e | 0.120 | | | 0.120 |
| 7 | 0.031 | 0.004 | 1.000 | Q89d | 0.162 | | | 0.162 |
| National Vulnerability Index | | | | | | | | |
| 1 | 2.598 | 0.433 | 0.433 | Safety | 0.170 | 0.048 | | 0.128 |
| 2 | 1.358 | 0.226 | 0.659 | Empowerment | 0.181 | 0.226 | | 0.196 |
| 3 | 0.863 | 0.144 | 0.803 | Health | 0.212 | 0.204 | | 0.210 |
| 4 | 0.580 | 0.097 | 0.900 | Education | 0.218 | 0.002 | | 0.144 |
| 5 | 0.384 | 0.064 | 0.964 | Economic | 0.208 | 0.102 | | 0.172 |
| 6 | 0.217 | 0.036 | 1.000 | Digitalisation | 0.011 | 0.416 | | 0.150 |

Source: Authors' calculation on data from Round 7 Afrobarometer Survey.

**Table 5: Principal Component Analysis and weights**

| Principle Component Analysis | | | | Squared loadings | | | | | | Weights |
|---|---|---|---|---|---|---|---|---|---|---|
| Comp | Egen Val. | Proportional | Cumulative | Variable | F1 | F2 | F3 | F4 | F5 | F6 | |
| Dimension: Safety | | | | | | | | | | | |
| 1 | 3.724 | 0.219 | 0.219 | Q86a | 0.011 | 0.005 | 0.217 | 0.000 | 0.067 | 0.01 | 0.050 |
| 2 | 2.681 | 0.158 | 0.377 | Q78b | 0.004 | 0.079 | 0.100 | 0.066 | 0.083 | 0.117 | 0.062 |
| 3 | 2.147 | 0.126 | 0.503 | Q66 | 0.061 | 0.040 | 0.000 | 0.124 | 0.210 | 0.030 | 0.065 |
| 4 | 1.530 | 0.090 | 0.593 | Q60d | 0.036 | 0.029 | 0.089 | 0.012 | 0.170 | 0.013 | 0.051 |
| 5 | 1.143 | 0.067 | 0.660 | Q60a | 0.177 | 0.002 | 0.014 | 0.010 | 0.004 | 0.044 | 0.062 |
| 6 | 1.035 | 0.061 | 0.721 | Q57g | 0.006 | 0.079 | 0.104 | 0.110 | 0.000 | 0.740 | 0.121 |
| 7 | 0.825 | 0.048 | 0.770 | Q57b | 0.001 | 0.124 | 0.128 | 0.120 | 0.023 | 0.003 | 0.067 |
| 8 | 0.778 | 0.046 | 0.815 | Q56q | 0.076 | 0.104 | 0.016 | 0.006 | 0.002 | 0.008 | 0.050 |
| 9 | 0.667 | 0.039 | 0.854 | Q51 | 0.019 | 0.038 | 0.122 | 0.077 | 0.096 | 0.002 | 0.054 |
| 10 | 0.564 | 0.033 | 0.888 | Q50 | 0.060 | 0.050 | 0.003 | 0.127 | 0.054 | 0.048 | 0.055 |
| 11 | 0.493 | 0.029 | 0.917 | Q49p | 0.004 | 0.159 | 0.017 | 0.106 | 0.040 | 0.065 | 0.061 |
| 12 | 0.412 | 0.024 | 0.941 | Q43g | 0.016 | 0.042 | 0.135 | 0.036 | 0.002 | 0.009 | 0.043 |
| 13 | 0.307 | 0.018 | 0.959 | Q40 | 0.147 | 0.003 | 0.038 | 0.031 | 0.003 | 0.085 | 0.063 |
| 14 | 0.259 | 0.015 | 0.974 | Q14 | 0.001 | 0.222 | 0.016 | 0.006 | 0.051 | 0.102 | 0.066 |
| 15 | 0.180 | 0.010 | 0.985 | Q11b | 0.164 | 0.003 | 0.000 | 0.006 | 0.000 | 0.058 | 0.056 |
| 16 | 0.142 | 0.008 | 0.993 | Q11a | 0.143 | 0.009 | 0.000 | 0.029 | 0.158 | 0.004 | 0.064 |
| 17 | 0.142 | 0.006 | 1.000 | Q10a | 0.070 | 0.010 | 0.000 | 0.072 | 0.039 | 0.319 | 0.063 |
| Dimension: Empowerment | | | | | | | | | | | |
| 1 | 4.213 | 0.383 | 0.383 | Q95c | 0.079 | 0.008 | 0.004 | | | | 0.047 |
| 2 | 2.162 | 0.197 | 0.580 | Q38f | 0.026 | 0.167 | 0.042 | | | | 0.068 |
| 3 | 1.283 | 0.117 | 0.696 | Q38e | 0.169 | 0.083 | 0.003 | | | | 0.117 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 4 | 0.942 | 0.086 | 0.782 | Q38d | 0.160 | 0.007 | 0.002 | 0.090 |
| 5 | 0.830 | 0.075 | 0.857 | Q20b | 0.068 | 0.165 | 0.040 | 0.090 |
| 6 | 0.616 | 0.056 | 0.913 | Q19b | 0.068 | 0.138 | 0.116 | 0.096 |
| 7 | 0.409 | 0.037 | 0.950 | Q19a | 0.102 | 0.191 | 0.082 | 0.124 |
| 8 | 0.242 | 0.022 | 0.973 | Q18b | 0.078 | 0.005 | 0.186 | 0.075 |
| 9 | 0.160 | 0.015 | 0.987 | Q16 | 0.051 | 0.023 | 0.030 | 0.040 |
| 10 | 0.091 | 0.008 | 0.995 | Q9 | 0.154 | 0.112 | 0.476 | 0.196 |
| 11 | 0.049 | 0.004 | 1.000 | Q77d | 0.109 | 0.099 | 0.011 | 0.090 |
| Dimension: Health | | | | | | | | |
| 1 | 3.131 | 0.313 | 0.313 | Q92b | 0.000 | 0.184 | 0.033 | 0.074 |
| 2 | 2.785 | 0.279 | 0.592 | Q57a | 0.140 | 0.004 | 0.112 | 0.084 |
| 3 | 1.789 | 0.179 | 0.770 | Q56j | 0.012 | 0.087 | 0.248 | 0.094 |
| 4 | 0.715 | 0.072 | 0.842 | Q56i | 0.044 | 0.122 | 0.230 | 0.115 |
| 5 | 0.520 | 0.062 | 0.904 | Q56g | 0.110 | 0.154 | 0.032 | 0.107 |
| 6 | 0.3459 | 0.035 | 0.939 | Q49g | 0.160 | 0.001 | 0.110 | 0.091 |
| 7 | 0.244 | 0.024 | 0.963 | Q49e | 0.217 | 0.006 | 0.085 | 0.110 |
| 8 | 0.200 | 0.020 | 0.983 | Q8c | 0.188 | 0.092 | 0.021 | 0.115 |
| 9 | 0.114 | 0.011 | 0.994 | Q8b | 0.107 | 0.098 | 0.054 | 0.092 |
| 10 | 0.055 | 0.005 | 1.000 | Q8a | 0.017 | 0.250 | 0.030 | 0.104 |
| Dimension: Education | | | | | | | | |
| 1 | 1.696 | 0.282 | 0.283 | Q97 | 0.016 | 0.180 | 0.469 | 0.195 |
| 2 | 1.422 | 0.237 | 0.520 | Q77a | 0.004 | 0.174 | 0.425 | 0.176 |
| 3 | 1.184 | 0.197 | 0.717 | Q57c | 0.266 | 0.125 | 0.042 | 0.158 |
| 4 | 0.792 | 0.132 | 0.849 | Q56h | 0.088 | 0.246 | 0.001 | 0.116 |
| 5 | 0.697 | 0.116 | 0.965 | Q49c | 0.288 | 0.251 | 0.037 | 0.207 |
| 6 | 0.208 | 0.035 | 1.000 | Q49b | 0.337 | 0.023 | 0.026 | 0.148 |
| Dimension: Economic | | | | | | | | |
| 1 | 2.578 | 0.368 | 0.368 | Q94 | 0.079 | 0.098 | 0.282 | 0.135 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2 | 1.731 | 0.247 | 0.616 | Q77c | 0.267 | 0.084 | 0.095 | 0.169 |
| 3 | 1.412 | 0.202 | 0.817 | Q77b | 0.250 | 0.100 | 0.107 | 0.169 |
| 4 | 0.496 | 0.071 | 0.888 | Q8d | 0.022 | 0.022 | 0.500 | 0.140 |
| 5 | 0.413 | 0.059 | 0.947 | Q5 | 0.029 | 0.389 | 0.000 | 0.131 |
| 6 | 0.357 | 0.051 | 0.998 | Q4B | 0.147 | 0.221 | 0.014 | 0.136 |
| 7 | 0.012 | 0.002 | 1.000 | Q4A | 0.206 | 0.085 | 0.002 | 0.119 |
| Dimension: Digitalisation | | | | | | | | |
| 1 | 5.255 | 0.751 | 0.750 | Q93 | 0.120 | | | 0.120 |
| 2 | 0.720 | 0.103 | 0.853 | Q91b | 0.161 | | | 0.161 |
| 3 | 0.437 | 0.062 | 0.916 | Q91a | 0.131 | | | 0.131 |
| 4 | 0.260 | 0.037 | 0.953 | Q90 | 0.146 | | | 0.146 |
| 5 | 0.202 | 0.029 | 0.982 | Q89f | 0.143 | | | 0.143 |
| 6 | 0.072 | 0.010 | 0.992 | Q89e | 0.131 | | | 0.131 |
| 7 | 0.054 | 0.008 | 1.000 | Q89d | 0.166 | | | 0.166 |
| Rural Vulnerability Index | | | | | | | | |
| 1 | 2.613 | 0.435 | 0.435 | Safety | 0.150 | 0.022 | | 0.105 |
| 2 | 1.382 | 0.230 | 0.666 | Empowerment | 0.218 | 0.182 | | 0.206 |
| 3 | 0.828 | 0.138 | 0.804 | Health | 0.161 | 0.230 | | 0.185 |
| 4 | 0.525 | 0.088 | 0.891 | Education | 0.228 | 0.012 | | 0.153 |
| 5 | 0.463 | 0.077 | 0.970 | Economic | 0.193 | 0.018 | | 0.132 |
| 6 | 0.190 | 0.031 | 1.000 | Digitalisation | 0.009 | 0.536 | | 0.191 |

Source: Authors' calculation on data from Round 7 Afrobarometer Survey.

**Table 6: Descriptive statistics on indexes**

| | Obs. | Mean | Std. Dev | Min | Max |
|---|---|---|---|---|---|
| National Vulnerability Index | | | | | |
| Safety | 34 | 0.449 | 0.100 | 0.207 | 0.649 |
| Empowerment | 34 | 0.508 | 0.145 | 0.184 | 0.721 |
| Health | 34 | 0.420 | 0.125 | 0.119 | 0.702 |
| Education | 34 | 0.425 | 0.124 | 0.208 | 0.688 |
| Economic | 34 | 0.442 | 0.122 | 0.212 | 0.716 |
| Digitalisation | 34 | 0.455 | 0.246 | 0.069 | 0.986 |
| Composite National Index | 34 | 0.503 | 0.157 | 0.273 | 0.848 |
| Rural Vulnerability Index | | | | | |
| Safety | 34 | 0.522 | 0.105 | 0.341 | 0.807 |
| Empowerment | 34 | 0.529 | 0.146 | 0.180 | 0.766 |
| Health | 34 | 0.411 | 0.121 | 0.091 | 0.717 |
| Education | 34 | 0.416 | 0.114 | 0.230 | 0.613 |
| Economic | 34 | 0.448 | 0.121 | 0.207 | 0.736 |
| Digitalisation | 34 | 0.355 | 0.220 | 0.040 | 0.998 |
| Composite Rural Index | 34 | 0.455 | 0.146 | 0.232 | 0.787 |

Source: Authors' calculation on data from Round 7 Afrobarometer Survey.

**Table 7: NWVI and Rankings**

| Country | Safety | Rank | Empow | Rank | Health | Rank | Educ | Rank | Econ | Rank | Digit | Rank | Global | Rank |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Benin | 0.411 | 24 | 0.550 | 14 | 0.337 | 26 | 0.359 | 23 | 0.484 | 12 | 0.201 | 30 | 0.430 | 22 |
| Botswana | 0.650 | 1 | 0.715 | 3 | 0.668 | 2 | 0.688 | 1 | 0.485 | 11 | 0.631 | 9 | 0.848 | 1 |
| Burkina Faso | 0.463 | 14 | 0.349 | 31 | 0.490 | 9 | 0.385 | 22 | 0.450 | 16 | 0.220 | 28 | 0.427 | 23 |
| Cabo Verde | 0.515 | 8 | 0.480 | 20 | 0.466 | 13 | 0.345 | 25 | 0.249 | 33 | 0.876 | 2 | 0.508 | 16 |
| Cameroon | 0.298 | 33 | 0.444 | 24 | 0.384 | 22 | 0.469 | 12 | 0.397 | 21 | 0.535 | 12 | 0.434 | 21 |
| Cote d'Ivoire | 0.432 | 21 | 0.260 | 32 | 0.308 | 30 | 0.279 | 30 | 0.372 | 26 | 0.397 | 19 | 0.291 | 33 |
| Eswatini | 0.422 | 23 | 0.398 | 26 | 0.527 | 5 | 0.469 | 11 | 0.373 | 25 | 0.612 | 10 | 0.509 | 15 |
| Gabon | 0.207 | 34 | 0.469 | 22 | 0.119 | 34 | 0.289 | 28 | 0.380 | 23 | 0.803 | 4 | 0.306 | 30 |
| Gambia | 0.458 | 15 | 0.719 | 2 | 0.539 | 4 | 0.483 | 9 | 0.675 | 2 | 0.564 | 11 | 0.740 | 3 |
| Ghana | 0.531 | 6 | 0.697 | 5 | 0.433 | 18 | 0.533 | 6 | 0.716 | 1 | 0.466 | 17 | 0.729 | 4 |
| Guinea | 0.381 | 27 | 0.483 | 19 | 0.244 | 31 | 0.282 | 29 | 0.292 | 30 | 0.315 | 23 | 0.294 | 32 |
| Kenya | 0.387 | 26 | 0.491 | 18 | 0.504 | 7 | 0.682 | 2 | 0.443 | 17 | 0.504 | 13 | 0.595 | 9 |
| Lesotho | 0.596 | 4 | 0.721 | 1 | 0.462 | 14 | 0.401 | 20 | 0.572 | 5 | 0.447 | 18 | 0.674 | 6 |
| Liberia | 0.315 | 32 | 0.601 | 11 | 0.412 | 21 | 0.398 | 21 | 0.613 | 4 | 0.267 | 26 | 0.515 | 13 |
| Madagascar | 0.437 | 19 | 0.366 | 28 | 0.203 | 33 | 0.456 | 14 | 0.404 | 20 | 0.069 | 34 | 0.303 | 31 |
| Malawi | 0.434 | 20 | 0.648 | 7 | 0.312 | 28 | 0.208 | 34 | 0.321 | 29 | 0.098 | 32 | 0.346 | 28 |
| Mali | 0.428 | 22 | 0.567 | 13 | 0.499 | 8 | 0.338 | 26 | 0.435 | 19 | 0.159 | 31 | 0.470 | 18 |
| Mauritius | 0.494 | 10 | 0.400 | 25 | 0.703 | 1 | 0.434 | 16 | 0.537 | 7 | 0.986 | 1 | 0.700 | 5 |
| Morocco | 0.455 | 17 | 0.184 | 34 | 0.431 | 20 | 0.248 | 33 | 0.283 | 31 | 0.763 | 6 | 0.334 | 29 |
| Mozambique | 0.325 | 30 | 0.358 | 29 | 0.476 | 11 | 0.413 | 19 | 0.389 | 22 | 0.316 | 22 | 0.388 | 26 |
| Namibia | 0.620 | 3 | 0.638 | 8 | 0.592 | 3 | 0.624 | 3 | 0.669 | 3 | 0.706 | 7 | 0.840 | 2 |
| Niger | 0.629 | 2 | 0.358 | 30 | 0.475 | 12 | 0.325 | 27 | 0.345 | 28 | 0.087 | 33 | 0.397 | 25 |
| Nigeria | 0.319 | 31 | 0.453 | 23 | 0.360 | 24 | 0.426 | 17 | 0.547 | 6 | 0.473 | 16 | 0.463 | 20 |
| Sao Tome P | 0.512 | 9 | 0.538 | 15 | 0.452 | 15 | 0.608 | 4 | 0.371 | 27 | 0.475 | 14 | 0.578 | 10 |
| Senegal | 0.475 | 12 | 0.624 | 9 | 0.432 | 19 | 0.425 | 18 | 0.470 | 15 | 0.474 | 15 | 0.570 | 11 |
| Sierra Leone | 0.381 | 28 | 0.525 | 17 | 0.343 | 25 | 0.504 | 8 | 0.479 | 13 | 0.270 | 25 | 0.468 | 19 |
| South Africa | 0.438 | 18 | 0.597 | 12 | 0.510 | 6 | 0.468 | 13 | 0.496 | 10 | 0.835 | 3 | 0.658 | 8 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sudan | 0.392 | 25 | 0.244 | 33 | 0.335 | 27 | 0.271 | 31 | 0.212 | 34 | 0.689 | 8 | 0.273 | 34 |
| Tanzania | 0.580 | 5 | 0.703 | 4 | 0.439 | 17 | 0.594 | 5 | 0.528 | 8 | 0.250 | 27 | 0.665 | 7 |
| Togo | 0.326 | 29 | 0.611 | 10 | 0.211 | 32 | 0.348 | 24 | 0.437 | 18 | 0.325 | 21 | 0.384 | 27 |
| Tunisia | 0.523 | 7 | 0.471 | 21 | 0.450 | 16 | 0.250 | 32 | 0.472 | 14 | 0.777 | 5 | 0.532 | 12 |
| Uganda | 0.457 | 16 | 0.674 | 6 | 0.310 | 29 | 0.437 | 15 | 0.505 | 9 | 0.205 | 29 | 0.511 | 14 |
| Zambia | 0.488 | 11 | 0.530 | 16 | 0.478 | 10 | 0.471 | 10 | 0.374 | 24 | 0.290 | 24 | 0.507 | 17 |
| Zimbabwe | 0.473 | 13 | 0.396 | 27 | 0.377 | 23 | 0.532 | 7 | 0.264 | 32 | 0.392 | 20 | 0.415 | 24 |

Source: Authors' calculation on data from Round 7 Afrobarometer Survey. NWVI refers to National Women Vulnerability Index.

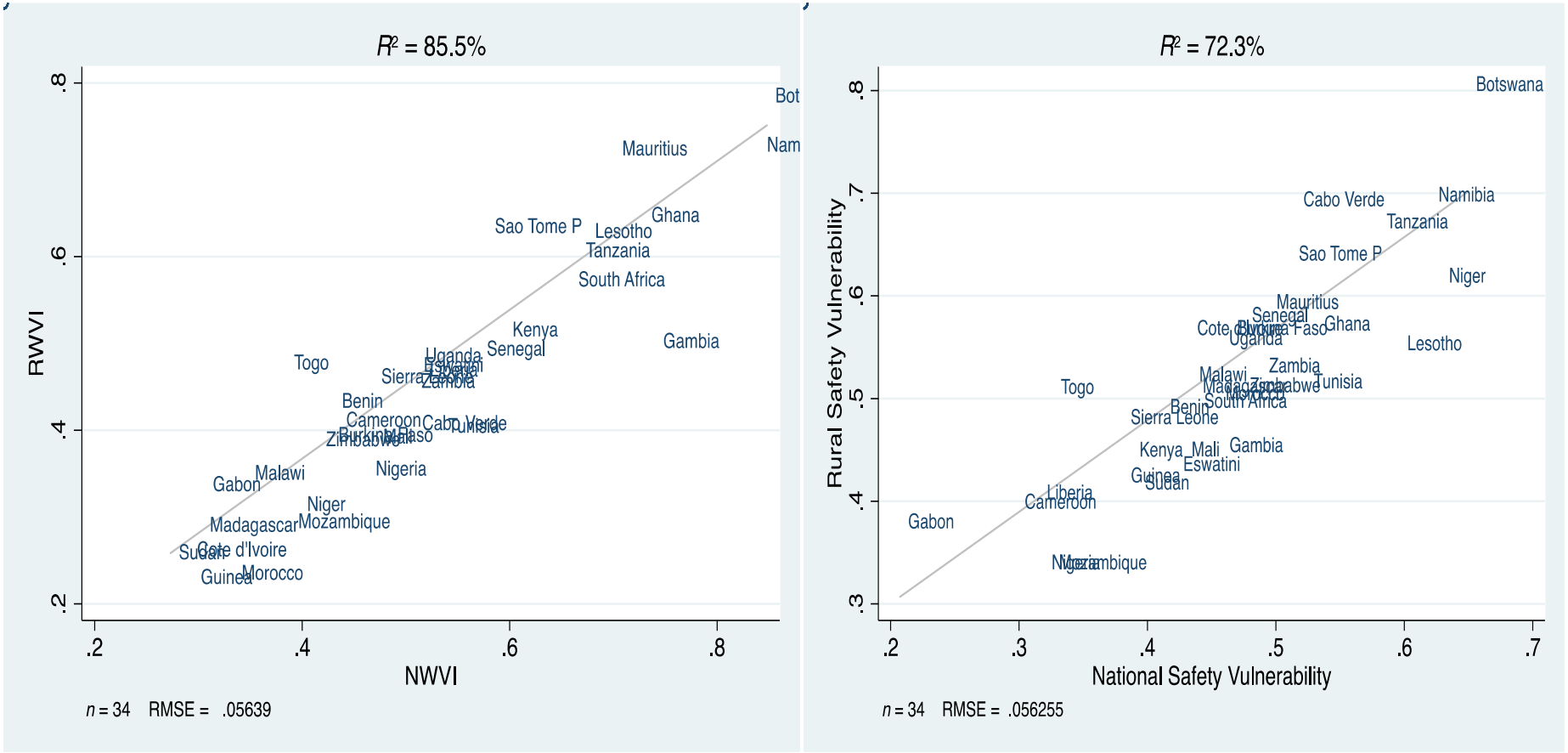
**Table 8: RWVI and Rankings**

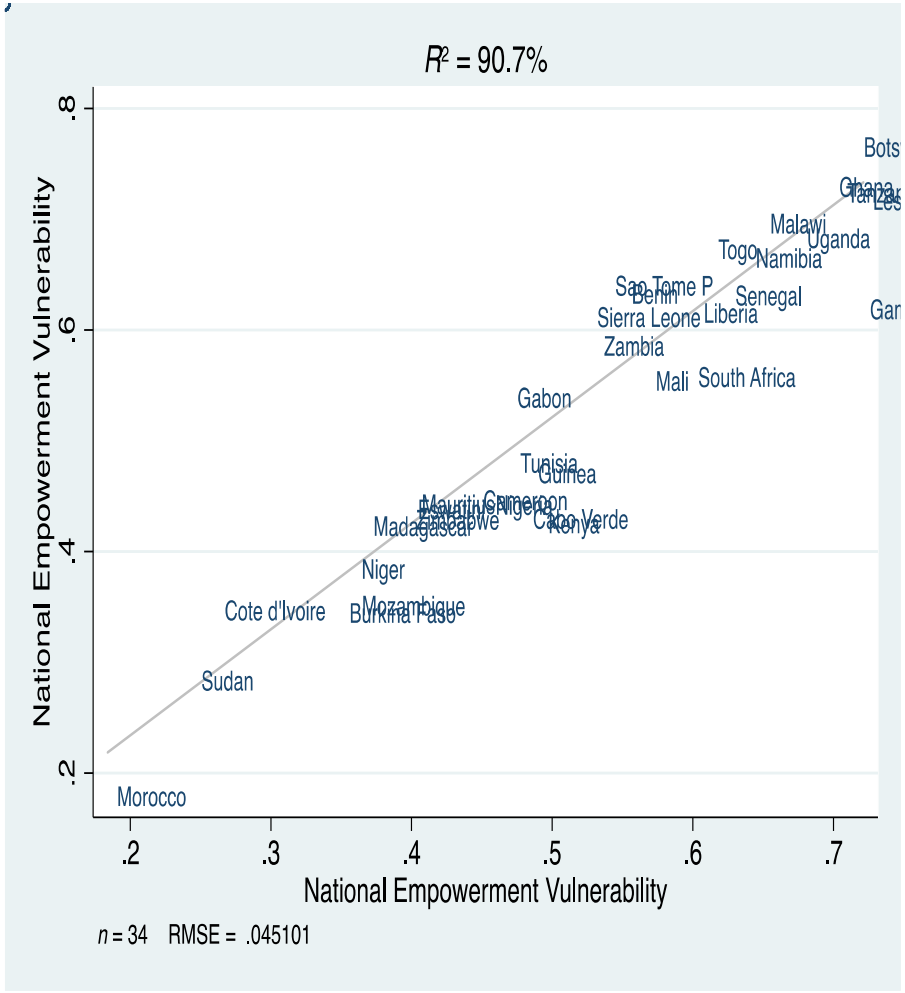
| Country | Safety | Rank | Empow | Rank | Health | Rank | Educ | Rank | Econ | Rank | Digit | Rank | Rural | Rank |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Benin | 0.493 | 22 | 0.633 | 10 | 0.330 | 27 | 0.411 | 21 | 0.511 | 12 | 0.153 | 29 | 0.435 | 18 |
| Botswana | 0.807 | 1 | 0.766 | 1 | 0.680 | 2 | 0.580 | 3 | 0.528 | 10 | 0.451 | 11 | 0.787 | 1 |
| Burkina Faso | 0.570 | 10 | 0.345 | 32 | 0.504 | 6 | 0.432 | 18 | 0.445 | 17 | 0.163 | 28 | 0.396 | 22 |
| Cabo Verde | 0.695 | 3 | 0.430 | 25 | 0.402 | 20 | 0.244 | 32 | 0.275 | 32 | 0.679 | 3 | 0.410 | 20 |
| Cameroon | 0.401 | 31 | 0.447 | 21 | 0.419 | 17 | 0.410 | 22 | 0.438 | 19 | 0.439 | 12 | 0.413 | 19 |
| Cote d'Ivoire | 0.570 | 11 | 0.348 | 31 | 0.255 | 31 | 0.263 | 28 | 0.373 | 27 | 0.295 | 19 | 0.264 | 31 |
| Eswatini | 0.437 | 27 | 0.439 | 24 | 0.517 | 4 | 0.434 | 17 | 0.393 | 23 | 0.591 | 6 | 0.476 | 14 |
| Gabon | 0.381 | 32 | 0.540 | 18 | 0.091 | 34 | 0.466 | 11 | 0.383 | 25 | 0.368 | 15 | 0.339 | 27 |
| Gambia | 0.456 | 24 | 0.619 | 12 | 0.442 | 13 | 0.326 | 26 | 0.562 | 6 | 0.507 | 8 | 0.504 | 10 |
| Ghana | 0.574 | 9 | 0.730 | 2 | 0.461 | 12 | 0.498 | 10 | 0.736 | 1 | 0.317 | 18 | 0.649 | 4 |
| Guinea | 0.426 | 28 | 0.471 | 20 | 0.257 | 30 | 0.244 | 33 | 0.294 | 31 | 0.212 | 23 | 0.232 | 34 |
| Kenya | 0.451 | 26 | 0.426 | 27 | 0.485 | 9 | 0.580 | 2 | 0.457 | 15 | 0.478 | 9 | 0.517 | 9 |
| Lesotho | 0.555 | 13 | 0.718 | 4 | 0.496 | 7 | 0.555 | 5 | 0.547 | 8 | 0.337 | 17 | 0.631 | 6 |
| Liberia | 0.410 | 30 | 0.616 | 13 | 0.467 | 10 | 0.411 | 20 | 0.595 | 3 | 0.151 | 30 | 0.471 | 15 |
| Madagascar | 0.513 | 18 | 0.424 | 28 | 0.226 | 33 | 0.447 | 16 | 0.374 | 26 | 0.040 | 34 | 0.292 | 30 |
| Malawi | 0.525 | 15 | 0.697 | 5 | 0.348 | 26 | 0.250 | 31 | 0.355 | 28 | 0.082 | 32 | 0.352 | 26 |
| Mali | 0.452 | 25 | 0.555 | 17 | 0.495 | 8 | 0.347 | 24 | 0.422 | 21 | 0.129 | 31 | 0.394 | 23 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mauritius | 0.595 | 7 | 0.444 | 22 | 0.717 | 1 | 0.504 | 9 | 0.571 | 5 | 0.998 | 1 | 0.726 | 3 |
| Morocco | 0.506 | 20 | 0.180 | 34 | 0.381 | 23 | 0.305 | 27 | 0.208 | 34 | 0.462 | 10 | 0.237 | 33 |
| Mozambique | 0.341 | 33 | 0.352 | 30 | 0.428 | 16 | 0.361 | 23 | 0.396 | 22 | 0.226 | 22 | 0.296 | 29 |
| Namibia | 0.700 | 2 | 0.666 | 8 | 0.536 | 3 | 0.558 | 4 | 0.670 | 2 | 0.544 | 7 | 0.730 | 2 |
| Niger | 0.621 | 6 | 0.385 | 29 | 0.436 | 14 | 0.344 | 25 | 0.310 | 29 | 0.080 | 33 | 0.316 | 28 |
| Nigeria | 0.341 | 34 | 0.443 | 23 | 0.412 | 19 | 0.250 | 30 | 0.581 | 4 | 0.383 | 14 | 0.357 | 25 |
| Sao Tome P | 0.642 | 5 | 0.641 | 9 | 0.504 | 5 | 0.613 | 1 | 0.444 | 18 | 0.405 | 13 | 0.636 | 5 |
| Senegal | 0.582 | 8 | 0.632 | 11 | 0.395 | 21 | 0.420 | 19 | 0.428 | 20 | 0.347 | 16 | 0.495 | 11 |
| Sierra Leone | 0.483 | 23 | 0.612 | 14 | 0.373 | 24 | 0.449 | 15 | 0.510 | 13 | 0.205 | 24 | 0.463 | 16 |
| South Africa | 0.499 | 21 | 0.558 | 16 | 0.428 | 15 | 0.450 | 14 | 0.530 | 9 | 0.736 | 2 | 0.575 | 8 |
| Sudan | 0.419 | 29 | 0.284 | 33 | 0.328 | 28 | 0.262 | 29 | 0.222 | 33 | 0.640 | 5 | 0.261 | 32 |
| Tanzania | 0.674 | 4 | 0.725 | 3 | 0.419 | 18 | 0.552 | 6 | 0.551 | 7 | 0.196 | 25 | 0.609 | 7 |
| Togo | 0.512 | 19 | 0.674 | 7 | 0.245 | 32 | 0.531 | 7 | 0.458 | 14 | 0.235 | 21 | 0.479 | 13 |
| Tunisia | 0.518 | 16 | 0.481 | 19 | 0.350 | 25 | 0.230 | 34 | 0.453 | 16 | 0.657 | 4 | 0.406 | 21 |
| Uganda | 0.560 | 12 | 0.684 | 6 | 0.308 | 29 | 0.459 | 12 | 0.527 | 11 | 0.168 | 27 | 0.487 | 12 |
| Zambia | 0.533 | 14 | 0.586 | 15 | 0.463 | 11 | 0.457 | 13 | 0.384 | 24 | 0.177 | 26 | 0.458 | 17 |
| Zimbabwe | 0.514 | 17 | 0.429 | 26 | 0.382 | 22 | 0.505 | 8 | 0.302 | 30 | 0.266 | 20 | 0.391 | 24 |

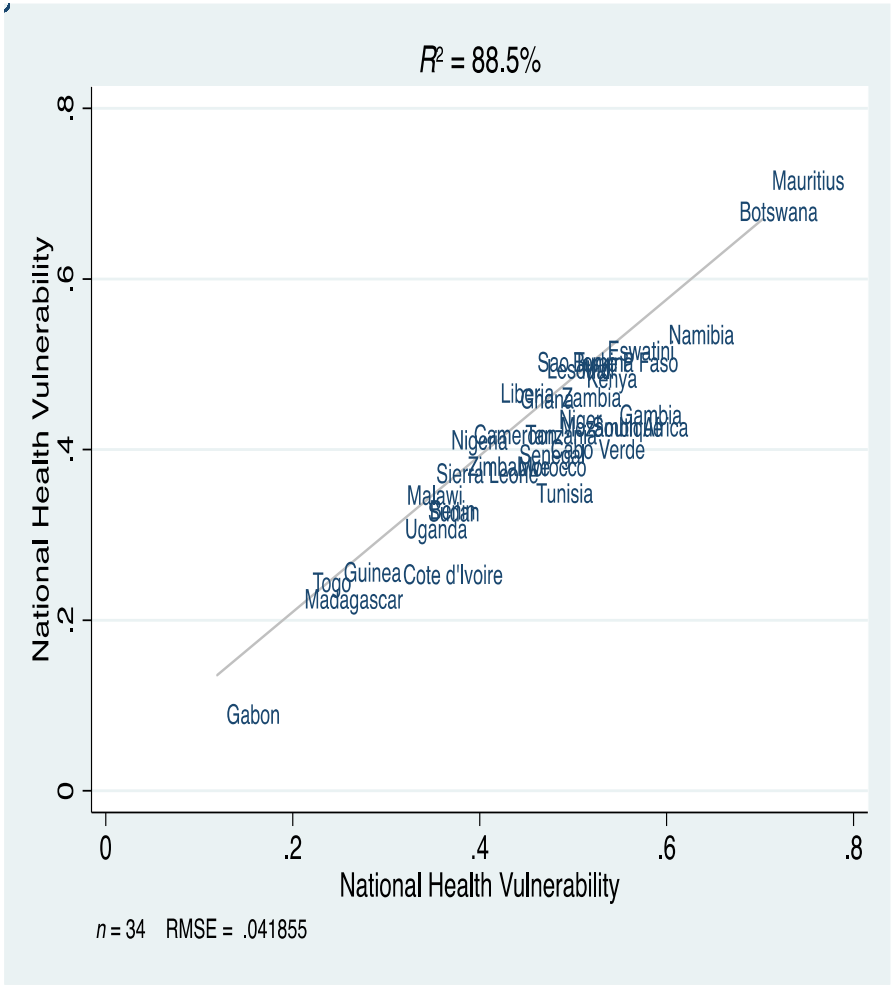
Source: Authors' calculation on data from Round 7 Afrobarometer Survey. RWVI refers to Rural Women Vulnerability Index.

**Figure 1: Relationships between NWVI and RWVI**

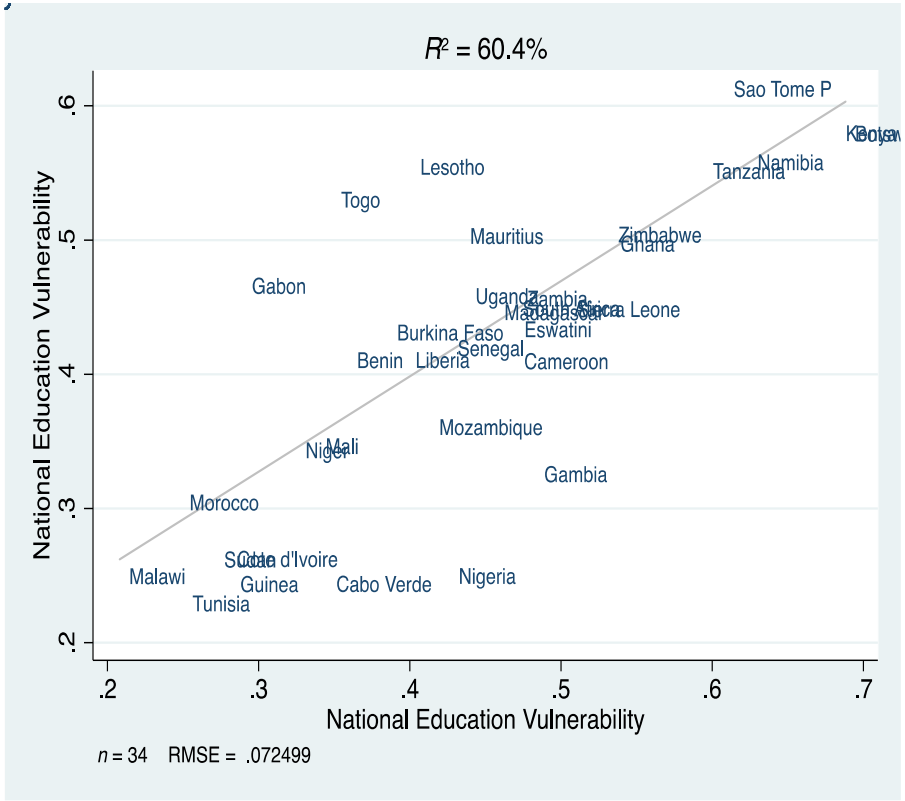


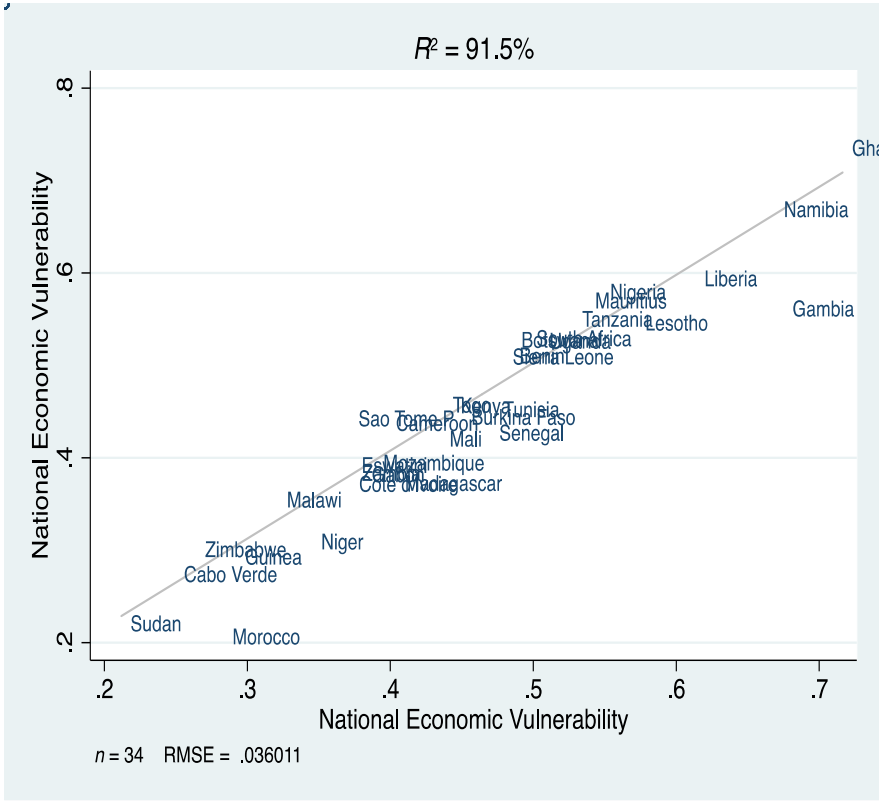


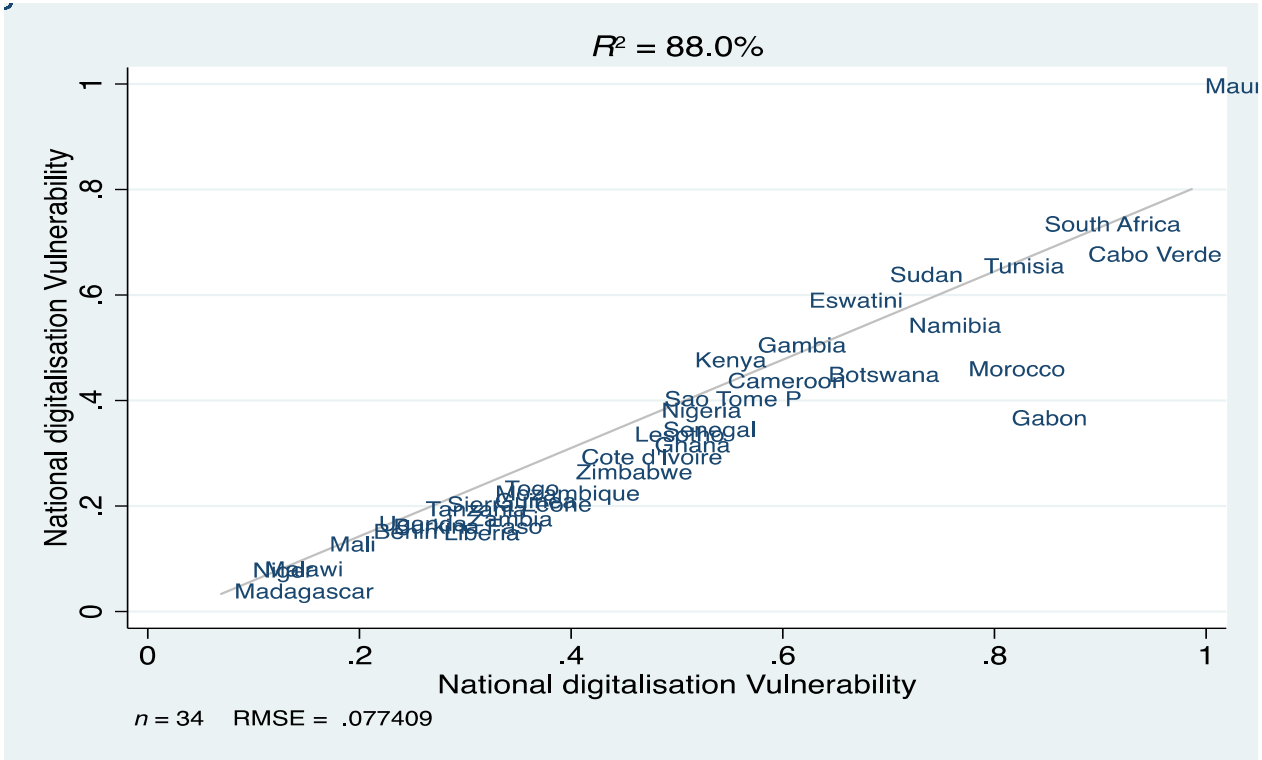
$R^2$ = 90.7%
National Empowerment Vulnerability
National Empowerment Vulnerability
Bots
Malawi
Uganda
Togo
Namibia
Sao Tome P
Benin
Senegal
Sierra Leone
Liberia
Zambia
Mali
South Africa
Gabon
Tunisia
Guinea
Cameroon
Madagascar
Cabo Verde
Kenya
Niger
Cote d'Ivoire
Mozambique
Burkina Faso
Sudan
Morocco
n = 34 RMSE = .045101

$R^2$ = 88.5%
National Health Vulnerability
National Health Vulnerability
Mauritius
Botswana
Namibia
Eswatini
Kenya
Liberia
Zambia
Gambia
Nigeria
Cabo Verde
Sierra Leone
Tunisia
Malawi
Uganda
Guinea
Cote d'Ivoire
Togo
Madagascar
Gabon
n = 34 RMSE = .041855


$R^2$ = 60.4%
National Education Vulnerability
National Education Vulnerability
.2
.3
.4
.5
.6
.7
Sao Tome P
Lesotho
Namibia
Tanzania
Togo
Mauritius
Zimbabwe
Ghana
Gabon
Uganda
Sierra Leone
Burkina Faso
Eswatini
Senegal
Benin
Liberia
Cameroon
Mozambique
Niger
Mali
Gambia
Morocco
Malawi
Guinea
Cabo Verde
Nigeria
Tunisia
n = 34 RMSE = .072499


$R^2$ = 91.5%
National Economic Vulnerability
National Economic Vulnerability
.2
.4
.6
.8
.2
.3
.4
.5
.6
.7
Namibia
Liberia
Nigeria
Mauritius
Gambia
Tanzania
Lesotho
Sierra Leone
Burkina Faso
Senegal
Mali
Malawi
Zimbabwe
Guinea
Niger
Cabo Verde
Sudan
Morocco
n = 34 RMSE = .036011




Source: Authors' calculation on data from Round 7 Afrobarometer Survey. NWVI and RWVI refer to National Women Vulnerability Index and Rational Women Vulnerability Index respectively.

**Table 9: Results for Robustness Checks**

| | Obs. | Mean | Std. Dev | Min | Max |
|---|---|---|---|---|---|
| National Vulnerability Index | | | | | |
| Safety | 34 | 0.454 | 0.080 | 0.266 | 0.613 |
| Empowerment | 34 | 0.470 | 0.121 | 0.205 | 0.663 |
| Health | 34 | 0.461 | 0.107 | 0.211 | 0.682 |
| Education | 34 | 0.454 | 0.110 | 0.253 | 0.713 |
| Economic | 34 | 0.461 | 0.110 | 0.265 | 0.698 |
| Digitalisation | 34 | 0.483 | 0.190 | 0.169 | 0.847 |
| CompositeNationalIndex | 34 | 0.468 | 0.150 | 0.243 | 0.798 |
| Rural Vulnerability Index | | | | | |
| Safety | 34 | 0.454 | 0.080 | 0.312 | 0.678 |
| Empowerment | 34 | 0.470 | 0.124 | 0.187 | 0.682 |
| Health | 34 | 0.459 | 0.107 | 0.192 | 0.688 |
| Education | 34 | 0.456 | 0.105 | 0.268 | 0.640 |
| Economic | 34 | 0.460 | 0.107 | 0.255 | 0.702 |
| Digitalisation | 34 | 0.477 | 0.178 | 0.200 | 0.905 |
| CompositeRuralIndex | 34 | 0.264 | 0.155 | 0.068 | 0.629 |

Source: Authors' calculation on data from Round 7 Afrobarometer Survey.