

# Food Policy, Governance and the South African Food Security

Adrino Mazenda\*

**Abstract** Good governance and properly aligned food policies are necessary strategies for food security. This article explores the impact of governance on South Africa's food security. The article utilised a cross-section time series analysis, underpinned by the Ridge regression modelling technique to test the relationship between the endogenous latent Food security (FS) variable (Food production index, Food Imports, Household dietary index, Gross Domestic Product and Prevalence of malnutrition in the total population) and the exogenous Governance indicators (Government effectiveness, Voice and accountability, Political Stability, Regulatory Quality, the rule of law, and Control of corruption), from 1996 to 2020, utilising secondary data from the Food Agriculture Organisation (FAO), and World Bank. Results from the article show that the South African food governance challenges are mostly related to Corruption, Government ineffectiveness, and Regulatory quality. Political stability and the Rule of law are almost insignificant to explain an impactful relationship. The article recommended developing a compendious food security framework targeting agriculture productivity, societal inclusion, and overall improvement of dietary intake in poor communities.

**Keywords:** Governance, Food Policy, Food Security, South Africa.

**JEL Classification:** Q18

## 1. Introduction

Food insecurity causes chronic undernourishment to over 12% of the global population (FAO, 2015). At the same time, a third of the world's food supply goes to waste every year (Rossi, Vink & Sigge, 2017). Tirivangasi (2017) argued that food security is regarded as a major priority for all countries worldwide. However, people who live with chronic hunger and extreme poverty are often excluded from political representation, government services, and government benefits. The relationship between chronic hunger and governance is implicit in the Food and Agriculture

---

Adrino Mazenda\* (✉)

\* University of Pretoria, School of Public Management and Administration, Pretoria, South Africa.

E-mail: adrino.mazenda@up.ac.za

Organisation's (FAO) definition of food security as "all people, at all times, having physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (FAO, 2015). Akanle, Adeshina, and Adesokan (2017) argued that food is a basic necessity that is key to human survival, and any state that failed to provide food supplies to its citizens adequately is regarded as underdeveloped. In many cases, food insecurity and malnourishment aggravate poverty, human wellness, and citizens' negative perceptions towards the state. The right to access food has been universally declared as a human right under the United Nations Declaration on Human Rights, the 1996 Rome Declaration of World Food Security and the United Nations Sustainable Development Goals set to be achieved by 2030.

Governments are directly and indirectly involved in enhancing food security. As such, all attempts to improve food security must also consider the role of governance (Candel, 2014). Sustainable agriculture and functioning governance systems are necessary for enhancing the food security position of a country.

The correlation of food security and governance suggests that attempts to reduce chronic hunger must integrate food security with governance systems, particularly accountability, transparency, effectiveness, and the rule of law (Haysom, 2015). This should extend to all stakeholders and should be part of food policies and the realization of the Sustainable Development Goals on food security.

Food security requires governance in all spheres. This follows the evidence of factors affecting governance, namely, globalization, the dominance of multinational companies, and weak public institutions, as major drivers of food insecurity in the world (McKeon, 2011). This is worsened by rising global food demand, putting pressure on already strained government resources. Effective coordination of governance, food security, and agriculture are key to reducing food insecurity (McKeon, 2011).

The challenges in South Africa's food security are mostly socio-economic, environmental, and governance-related. This is a major obstacle to the country meeting the Sustainable Development Goals and also fulfilling the constitutional mandate on the right to sufficient nutritious food (Pereira & Drimie, 2016). The environmental challenges encompass climate change, which has affected the overall food output. The socio-economic challenges relate to structural economic challenges, responsible for limited access to credit lines and smallholder farming support. The governance issues shape the South African economy's management and distribution of resources. Within the broad *governance* term are indicators determining the functioning of the state in fulfilling various mandates. It is against this background information that the article seeks to address the following research question:

- How does governance affect South Africa's food security?

In support of the research question, the article hypothesises that: *governance (as manifested by government effectiveness, regulatory quality, the rule of law, control of*

*corruption, political stability and voice and accountability) positively impacts South Africa food security as denoted by the latent variables of the Food Production Index, the Household Dietary Diversity Index, Gross Domestic Product, Food Imports and Malnutrition Prevalence within the total population.*

Similarly, the article answers the following sub-questions:

- What is the prevailing food policy framework in South Africa?
- What does the literature say about the relationship between food security and governance?
- What synthesis can be drawn from the preceding discussion?

This article draws on a Ridge Regression Model (RRM) to analyse the effect of governance on South Africa's food security. It argues that the country's food security challenges require, apart from institutional arrangements, good governance systems to eradicate poverty. It supports the essence of integrating supply-side and demand-side governance in enhancing the country's food security. Little is known, neither have adequate tests been done in the country, of how governance is a key factor in addressing national food security issues. The RRM presents an appropriate methodological framework for measuring the relationship between food security and governance. The reason is the model assumes non-normality and accounts for multicollinearity among test variables.

The first section provides an overview of the South African food policy framework. The second section provides the conceptual framework of the relationship between food security and governance. The third section presents the data and econometric approach materials and methods, followed by findings and analysis in the fourth section. The last section presents conclusions and recommendations.

## **2. South Africa food policy framework**

Every country in the world has policies that govern the management and distribution of food to people. National policies and strategies are used importantly to show a country's vision, budgetary concerns, priorities, and the course of action (Schönfeldt, 2015). The South African government likewise has robust policy frameworks that aim to promote food management and food security. As Mupindu (2015) observes, food security policy has become an increasingly critical global issue that is affected by interrelated variables. The need to curb malnutrition has been on the agenda of various global villages in line with the Committee on World Food Security, the Rome Declaration on Nutrition, and achieving sustainable development goals.

Therefore, the South African government instituted the Integrated Food Security Strategy in 2002, with the main focus on ensuring food availability. It emphasized relief on food price inflation through school feeding schemes, welfare pay-outs, and food parcels (Kirsten, 2012). While these mechanisms were essential as safeguards for food-insecure households, the strategy failed to provide a framework for addressing the complex dimensions of the food system. This was due to ineffective institutional

arrangements combining the food security programmes of both government and private participants (Pereira & Drimie, 2016).

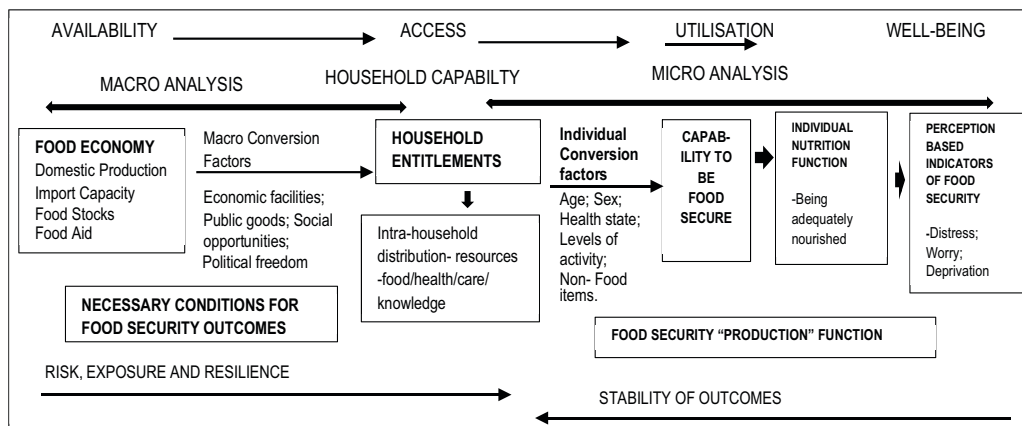
The 2013 Food and Nutrition Security Policy, together with the Fetsa Tlala, was endorsed by the cabinet with the aim of meeting the four pillars of food security at all economic levels. The policy expanded the Integrated Food Security Strategy and proposed inter-sectorial harmonization of existing policies. The policy did not meet the expected results due to the non-functional chain of command within the State's departments. Moreover, there was an absence of dialogue between the state institutions and various participants in the food sector. Specifically, the policy weakly recognized composite societal challenges in the South Africa food system (Pereira & Drimie, 2016). During the same period as the Food and Nutrition Security, the government enacted the National Development Plan, Vision 2030, which dictates strategies to improve food access. The NDP supports the food security social engagement between civil society, the private sector, the state, and other stakeholders. Such a gesture indicates the positive contribution of the state through the multi-sectoral approach (Pereira & Drimie, 2016). The equitable distribution of resources, continuous learning, and agriculture development were key in achieving food security from the program. This is in line with social safety nets, public works programs, agro-processing, and food value chains (NPC, 2012).

Many factors attribute to the failing policy systems governing food security in South Africa. In her study, Nkwana (2017) revealed that poor implementation of government policies due to insufficient synchronization in various spheres of government are responsible for the food insecurities experienced in the country. This is further constrained by the unplanned and inadequate information that would enable an analysis of food security gaps in the country (Altman, Hart & Jacobs, 2009). The latter scenario is blamed on prevailing poor communication, a lack of feedback, poor monitoring and evaluation, and a failure to report the consequences of food insecurity to citizens.

The lack of precise and recognized food security measures, especially policy targeting, shows a gap in the literature (Paes-Souza & Vaitsman, 2014). Therefore, in respect of these assertions, a measurement that is part of the greater monitoring and evaluation framework is critical for food security.

### **3. Conceptual framework**

Food security is a multidimensional and interdependent process encompassing numerous actors and activities. This study conceptualizes food security from the Sen (1999) capability approach and the integrated framework of Chiappero Martinetti and Pareglio (2009). The capability approach evaluates well-being and poverty for an individual person. The integrated framework postulates food security as a function of composite factors: macro-economic, micro-economic, social, environmental, and individual factors (Burchi & De Muro 2012; Aurino, 2013). The integration of the two is presented as a composite framework as presented in Figure 1.



**Figure 1.** Integrated Food Security framework

Source: Author iterations

The framework encompasses all four components of food security. Food availability, which is the supply side of food security, is entered as a macro-economic factor when all people have adequate quantities of food. Food access, which is the ability of households and individuals to acquire adequate food for a nutritious diet, as well as food utilization, which is proper feeding linked to sanitation, health care, clean water, and an adequate diet, are all entered as micro-economic factors. Finally, food stability, which is the capability to obtain food over time and protection from chronic threats, encompasses all the composite factors and is a state all nations aspire to (Aurino,2013; UNDP,1994).

The framework is unprecedented in its inclusion of consequences of food insecurity, such as psychological distress and societal exclusion, both critical aspects of human well-being. Second, it explores the association between micro-and macro-economic factors, unearthing the drivers of food security in each category. The macro-economic category emphasizes an enabling environment for sustainable food security outcomes through the interaction of socio-economic, micro-economic, environmental, and institutional factors. Finally, the micro-economic category shows that the composite food capability component is dependent on other basic factors, such as the distribution of resources, nutritional health, and education.

Both categories of the composite food security framework encompass governance issues. Governance is concerned with how the state distributes and manages public resources. Good governance leads to well-functioning state institutions. These institutions are key in employment, poverty eradication, and the food security of the nation. On the other hand, food insecurity can destabilize governance. (FHI, 2018). This manifests in the influx of armed conflicts within the low-income, food-deficient countries, depending on agricultural production (Pingali, 2002). Policies and programs that address agriculture and food security are hindered by complex political processes and

interactions between stakeholders (government, private sector, and farmers), who have unequal power and access to resources. Moreover, agricultural systems are often harmed by conflict, insufficient institutional capacity, and the bad design and implementation of government policies, and countries that do not adequately invest in agriculture are more likely to experience chronic food insecurity (FAO, 2016; Candel, 2014).

On the other hand, good governance supports the aims of agriculture and food security through multiple systems. A good governance system must be able to respond to a food crisis and address the complex problems of food insecurity in order to eliminate hunger (Pereira & Ruysenaar, 2012). The integration of governance to food security allows the formulation of food security strategies that respond to diverse and ever-changing needs by aligning objectives and actions across all three spheres of government. At the local level, civil society organizations can develop linkages with strategists and affected households, poor farmers, and other marginalized groups (women and black South Africans) by developing integrated programs that can address political and socio-economic obstacles that prevent improvements to nutrition and food security (Duncan, 2015).

Integrating principles of good governance, for instance, accountability and citizens' participation in food security interventions, could enhance positive development outcomes and improve farmers' access to agricultural food value chains. Senegal, Bolivia, Brazil, and Niger have operationally inclusive participation of farmers in food policy formulation, with visible successes in their food value chains (Suttie & Hussein, 2015).

The households should be encouraged to contribute to the goals of governance, particularly civic participation and the effective rule of law. Food insecurity increases grievances against institutions, hinders political participation, and contributes to outbreaks of social unrest (Hendrix & Brinkman, 2013). Reducing food insecurity and socio-economic and political obstacles necessitates that the government is responsive to its citizens. The implications are government stability, social cohesion between local partners and the government, and the empowerment of partners (stakeholders) in policy development in line with local needs (Hendrix & Brinkman, 2013).

Such exchanges have seen positive outcomes in several parts of the world. For example, food security programs in Nepal have improved community relationships with the government, and short-term jobs in agricultural programs promoted peace in Liberia (McCandless, 2011). The relationship between food security and governance can be supportive or destructive; a food-secure population can bolster stable governance, whereas a food-insecure population can destabilize governance (Brinkman & Hendrix, 2011). The following section presents the data and econometric approach to examine the impact of governance on South African food security.

#### **4. Materials and methods**

This study used a quantitative research approach, based on a cross-section time-series analysis of South African data on food security and governance indicators, obtained

from the World Bank World Development Indicators and Food and Agriculture Organisation (FAO) food security indicators, from 1996 to 2017.

The Ridge Regression Modelling (RRM) technique was utilised in analyzing the relationship between food security, latent variables, and governance indicators. The RRM technique is a method in statistics used to analyse a single response variable with two or more multicollinear variables (Sunril, 2015). This would likely be the case with the governance indicators, which all are related to each other.

According to Montgomery (1974 cited in NCSS, 2019), multicollinearity results from five sources, namely, data collection (data collected from a narrow space of the independent variables), physical constraints (differences in population range), overly defined models (more variables than observations), model specification (using independent variables that are powers of an original set of variables), and outliers. Multicollinearity is detected by first studying pairwise scatter plots of pairs of independent variables, identifying the near-perfect association of variables, and interpreting the correlation matrix. Secondly, it is detected by considering the Variance Inflation Factor (VIF). A VIF of less than 10 indicates the absence of collinearity. Thirdly, one can interpret the Eigen Values (EV) of the correlation matrix of independent or exogenous variables. Values close to zero indicate multicollinearity. A similar interpretation can be obtained by looking at the condition number of the EV. Large numbers above 100 indicate multicollinearity. Finally, the sign of the regression coefficient is significant. Variables with opposite signs of the expected might indicate multicollinearity.

The correction of multicollinearity should start with the source problem, either by collecting additional data, using a variable selection technique for an over-identified model, or removing the observations which could have induced the multicollinearity. When these steps are not possible, it is necessary to use the RRM. Ridge regression lowers conventional faults by adding a degree of bias to the regression estimates. Ridge regression estimations are based on standardized variables. Standardization is done by subtracting the means of variables (both dependent and independent, and dividing by their standard deviations) (Sunil, 2015). The ridge regression is drawn from the estimated ordinary least squares, regression coefficients, shown as:

$$\tilde{B} = (X'X)^{-1}X'\tilde{Y}$$

The analysis assumes standardization of variables, as such,  $X'X = R$ , where  $R$  is the correlation matrix of the independent variables. The estimates are unbiased and could relate to the population.

$$E(\hat{B}) = B$$

The variance-covariance matrix of the estimates is:

$$V(\hat{B}) = \sigma^2 R^{-1}$$

$\delta^2=1$ , on the assumption that the independent variables are standardized.

From the above, we find:

$$V(\hat{b}_j) = r^{jj} = \frac{1}{1} - R_j^2$$

where  $R^2$  is the variance obtained from regressing the independent variables, on the dependent variable  $X_j$ . This variance is the VIF, positively related to the  $R^2$ . Thus, as the  $R^2$  in the denominator gets closer to one (0,9 and above), the VIF will increase, and will have to face multicollinearity.

The ridge regression proceeds by adding a small value,  $k$ , to the diagonal elements of the correlation matrix (presented as a ridge); that is,

$$\dot{B}(R + kI)^{-1}X' \bar{Y}$$

where  $k$  is a positive quantity less than 1. The amount of bias in this estimator is given by:

$$\check{E}(\dot{B} - \underline{B}) = [(X'X + kI)^{-1}X'X - I]\underline{B}$$

and the covariance matrix is given by:

$$V(\dot{B}) = (X'X + kI)^{-1}X'X(X'X + kI)^{-1}$$

where  $k$  is the mean squared error (the variance plus the bias squared in the ridge estimator is less than the least-squares estimator), the appropriate value of  $k$  depends on knowing the true regression coefficients (which are being estimated).

Hoerl, Kinnard, and Baldwin (1975) proposed an iterative method for selecting  $k$ , based on the formula:

$$k = ps^2 / \dot{B}' \dot{B}$$

The least-squares coefficients are used to obtain the value of  $k$ . The  $k$  value is a catalyst for the determination of a new set of coefficients. The procedure's weakness is non-convergence. As such, NCSS has modified the procedure such that if the resulting  $k$  is greater than one, the new value of  $k$  is equal to the last value of  $k$  divided by two. This calculated value of  $k$  is mostly preferred to the ridge trace method, which is subject to human error on choosing high values of  $k$  (NCSS, 2019).

The RRM implicit model function is presented as:

$$Y_t = \beta_0 + \beta_1 X_1 + e$$

Where  $Y_t$  = Food security (FS) latent variables (FPI, HDDI, MN GDP, FI),  $\beta_1$  = Parameter estimate,  $X_1$  = Governance Indicators (Contr Crpt, Rul Law, Reg Qual, Gov Eff, Polit Stab, Vc Acnt), and  $e$  is the idiosyncratic error term. The regression model is presented as follows:

$$FS(FPI, HDI, MN, GDPFI)_t = \beta_0 + \beta_1 GOV_t + \mu_t$$

The FS are outcome indicators of distinct dimensions of food security, namely, (i) Food Production index (FPI) (availability) (World Bank, 2019); (ii) Household Dietary Diversity Index (HDDI) (utilization) World, Bank, 2019); (iii) Prevalence of Malnutrition



in the Total Population (utilization); (iv) Gross Domestic Product (GDP) (annual % growth) (access); and (v) Food Imports (% of total population) (Stability) (FAO, 2019). The FPI is a composition of edible and nutritious food crops. The composition excludes tea and coffee, which, although edible, have no nutritional value. The HDDI is the ratio of aggregate dietary energy supply (kilocalories/per day/per person) provided by staple foods (cereals and starchy roots). A low value indicates a high diet diversification. The prevalence of malnutrition (MN) is a utilization dimension providing data on the nutritional status of the whole population (Aurino, 2013).

GDP reflects the food access component of food security and consists of three parts: physical, economic, and socio-cultural. The physical component entails efficiency in food production. The economic component reflects the affordability status of the population in buying adequate food. The socio-cultural component arises when conflict, strife, and other social barriers, such as gender, hinder people's access to food (Napoli, 2011).

FI expresses the proportion of food imports in total merchandise imports. The increase is attributed to increases in consumption. The increase can be due either to changes in diet or to population demand from migration and urbanization (Rakotoarisoa, Lafrate, & Paschali, 2012). Low food imports reflect stability in food security.

As argued in the main research question and literature review, the ability of a nation to be food secure is undoubtedly influenced by governance issues. The indicators form part of the RRM, providing possible channels of policy intervention. The indicators are obtained from the World Bank, and the rationale for their inclusion are i) Voice and Accountability (Vc Acnt), which refers to the democratic right of selecting government leadership. ii) Government Effectiveness (Gov Eff), shows the people's views on both public service and civil service quality. It also relates to government commitment to integrity in policy formulation and implementation. iii) Political Stability (Polit Stab) measures the probability of violence from political activism, including terrorism, sabotage, and crime. v) Regulatory Quality (Reg Qual) shows the ability of the government to implement sound policies and regulations, mostly in the private sector. vi) the rule of law (Rule Law) relates to satisfaction agents have with the law and society. Of importance is the enforcement of property rights and contract enforcement. vii) Control of Corruption (Contr Crpt) shows the degree to which public power is misused for private gain. Of importance are issues of state capture, nepotism, and other composite forms of corruption.

## 5. Results and analysis

Results of the relationship between Food Security and Governance are reported from the ridge regression analysis, presented in Table 1. The ridge regression analysis is recommended for the ability to control for multicollinearity in Governance, which is an independent variable comprising collinear variables.

Five models explained by each of the FS latent variables are presented in the regression analysis. The models present first results on the preliminary variable multicollinearity tests, namely, correlation tests, VIF, and EV. Second is the analytical session, comprising the model specification, presented by  $k$ , the variance of the model, presented by  $R^2$ , standardized coefficients, and the F- statistical, Analysis of Variance (ANOVA). The F statistic interprets the statistical significance of group means. If the null hypothesis is true, F should be close to 1. A high F-statistic shows that the model is not compatible with the data. The interpretations of  $k$ ,  $R^2$  and the standardized coefficients are presented in Section 4.1.

**Table 1.** Food Production Index Analysis

Model 1: Food Production Index (FPI):  $K=100\ 000$  ( $R^2=0,5644$ )  $F= 2.5916$

Variable	Correlation	VIF	EV	EV Condition	Standardized Regression Coefficient
Vc Acnt	-0,778220	0,1130	3,339641	1,00	-0,1948
Polit Stab	0,566246	0,1810	1,266776	2,64	0,1185
Gov Eff	-0,736476	0,1353	0,919396	3,63	-0,1435
Reg Qual	-0,419860	0,2041	0,281147	11,88	-0,0959
Rul Law	-0,185777	0,2399	0,123281	27,09	0,0079
Contr Crpt	-0,848598	0,1302	0,069759	47,87	-0,2372

*Source: Author iterations from NCSS 2020*

In model 1,  $k=100\ 000$ , Governance indicators explain 56% of the FPI variance, which is a strong relationship. The correlation matrix explains the prevalence of a negative association between FPI and most Governance indicators. The VIF, EV, of less than 10, and the EV condition less than 100, shows an absence of multicollinearity in the model. The model fits well with the data, with a low F statistic of 2,5.

Vc Acnt, Gov Eff, Reg Qual, and Contr Crpt have a negative relationship with FPI. A 1-unit change in Vc Acnt, Gov Eff, Reg Qual, and Contr Crpt will cause a decline in FPI by 19%, 14%, 9%, and 23%, respectively.

Low regulatory quality, government ineffectiveness, lack of voice and accountability of citizens towards agriculture production activities, and high incidences of corruption in agriculture, and production-related processes, including distribution of resources and financial support services, will result in an overall decline in agriculture output, measured by the FPI. Furthermore, government ineffectiveness is evidenced by the regulation of food systems on multiple levels, with little coordination funneling into the three spheres of government. This has hampered inclusive and just food

systems in the country. Understanding and working with all spheres of government and relevant stakeholders will promote an inclusive and just food system in South Africa, which is needed to improve food production (Makwela, 2018).

Similarly, clear differences exist between the goals of the South African corporate agri-food system and the government's socio-economic development goals. There is, therefore, a need to align the system outcomes with governance processes (Ledger, 2016). A positive relationship exists between Rul law, Polit Stab, and FPI. For a unit change in Rul law, and Polit Stab and FPI increase by 11% and about 1%, respectively. The contribution of Polit-Stab is almost insignificant, while Rul law is lower due to a lack of government oversight in the food sector. It is also from a failure to regulate the entire food sector in line with the Hazard Analysis and Critical Control Points (HACCP) safety approach of the United Nations. Only peanut butter complies due to the high risk of aflatoxin contamination and inclusion in school feeding schemes (Crouth, 2018).

**Table 2.** Household Dietary Diversity Index analysis

Model 2: Household Dietary Diversity Index (HDDI):  $K=100\ 000$  ( $R^2=0.3845$ )  
 $F=1,2494$

Variable	Correlation	VIF	Eigen Value	EV Condition	Standardized Regression Coefficient
Vc Acnt	-0,643969	0,1130	3,339641	1,00	-0,1992
Polit Stab	0,395086	0,1810	1,266776	2,64	0,0395
Gov Eff	-0,690018	0,1353	0,919396	3,63	-0,2383
Reg Qual	-0,105315	0,2041	0,21147	11,88	0,0471
Rul Law	0,105315	0,2399	0,123281	27,09	0,1278
Contr Crpt	-0,551935	0,1302	0,069759	47,87	0,1238

Source: Author iterations from NCSS 2020

In model 2,  $k=1\ 000\ 000$ , Governance indicators explain 38% of the FPI variance, which is a moderate relationship. The correlation matrix explains the prevalence of a negative association between HDDI and most Governance indicators. The VIF, EV of less than 10, and the EV condition less than 100 show an absence of multicollinearity in the model. The model fits well with the data, with a low F statistic of 1,2.

A positive relationship exists between Polit Stab, Reg Qual, Rul Law, and Contr Crpt and HDDI. A 1-unit change in Polit Stab, Reg Qual, Rul Law and Contr Crpt will cause an increase in HDDI of 3%, 4%, 13%, and 12 %, respectively.

Upholding the rule of law, control of corruption, and regulatory quality, as reflected by the government's ability to formulate policies, is positively related to HDDI. The South African government has introduced numerous agriculture policies since 1994. Even though implementation is still a challenge, there is a positive reflection on improvement and revision, with the government enacting the food security policies in the 2030 development agenda (Nkwana, 2017).

Vc Acnt and Gov Eff will cause a decline in HDDI by 19% and 23%, respectively. An ineffective government riddled with skills challenges and corruption, as evidenced in various inquiries, such as the Zondo commission, faces challenges in achieving nutritional food adequacy for its citizens (Gordhan, 2018). This is further worsened by the lack of cooperation between state departments in the provision of key information on state-capture allegations. This is particularly notable in the non-compliance of the state security agency in issuing security clearance certificates (Ramphela, 2018).

**Table 3.** Total Malnutrition analysis

Model 3: Total Malnutrition (MN):  $K=0,437699$  ( $R^2=0,5630$ )  $F=2,5770$

Variable	Correlation	VIF	Eigen Value	EV Condition	Standardized Coefficient
Vc Acnt	-0,166706	9,0971	3,339641	1,00	0,1427
Polit Stab	-0,054106	3,8193	1,266776	2,64	-0,1413
Gov Eff	-0,657379	5,3501	0,919396	3,63	-0,2822
Reg Qual	-0,692557	2,4553	0,281147	11,88	-0,2573
Rul Law	-0,266045	1,3430	0,123281	27,09	-0,2573
Contr Crpt	-0,651641	6,1151	0,069759	47,87	-0,1028

Source: Author iterations from NCSS 2020

In model 3,  $k=0,437699$ , Governance indicators explain 56% of the MN variance, which is a strong relationship. The correlation matrix explains the prevalence of the negative association between MN and all Governance indicators. The VIF, EV of less than 10, and the EV condition less than 100 show an absence of multicollinearity in the model. The model fits well with the data, with a low F statistic of about 2,5.

Except for Vc Acnt, all the other governance indicators have a negative relationship with FPI. A 1-unit change in Polit Stab, Gov Eff, Reg Qual, Rul Law, and Contr Crpt will cause a decline in FPI by 14%, 28%, 25%, 25%, and 10%, respectively.

According to FAO (2019), 4,6 % of the population suffers from hunger. From this population, children are the most affected, with stunting prevalent in the 0-59-month category. The same problem affects children under 14 years, pregnant women 14-65,

and the whole population, mainly affected by obesity, as the other form of malnutrition. According to Van de Merwe (2017), a quarter of South Africa's 0-59-month children are stunted, costing the nation over R40 billion (US\$2 743 billion) annually. This is further worsened by corruption scandals in nutritional support and the South African Social Security Agency's child grant support administration case. The agency is a necessary source of income to finance the country's children's food and nutrition. In the administration of the grant, corruption challenges impact negatively on child food security and nutrition, leading to continuous incidences of stunting and malnutrition in the school-going age (Department of Social Development, 2019).

Government ineffectiveness in enacting effective food security and nutrition policies is manifest from the Department of Health and Basic Education and Social Development, with many service delivery challenges needing to be addressed (Health Professional Councils of South Africa, 2016).

**Table 4.** Gross Domestic Product analysis

Model 4: Gross Domestic Product (GDP):  $K=1\ 000\ 000$  ( $R^2=0,3368$ )  $F=1,0156$

Variable	Correlation	VIF	Eigen Value	EV Condition	Standardized Regression Coefficient
Vc Acnt	0,161268	9,0971	3,339641	1,00	0,0428
Polit Stab	0,257175	3,8193	1,266776	2,64	0,2014
Gov Eff	0,369258	5,3501	0,919396	3,63	0,0676
Reg Qual	0,616262	2,4553	0,281147	11,88	0,2293
Rul Law	0,292180	1,3430	0,123281	27,09	0,1013
Contr Crpt	0,289133	6,1151	0,069759	47,87	0,1680

Source: Author iterations from NCSS 2020

In model 4,  $k=1\ 000\ 000$  and Governance indicators explain 33% of GDP variance, which is a moderate relationship. The correlation matrix explains a positive association between GDP and all Governance indicators. The VIF, EV of less than 10, and the EV condition less than 100 show an absence of multicollinearity in the model. The model fits well with the data, with an F statistic of 1.

A 1-unit change in Polit Stab, Reg Qual, Rul Law, and Contr Crpt will cause an increase in GDP between 10% and 25%. A politically stable environment, supported by sound regulatory systems, adherence to the rule of law, and improvements in the control of corruption, as evidenced by the commissions of inquiry on accountability, positively affects the country's growth (GDP). These have a multiplier effect on other economic

sectors as investor confidence improves. Though positive, the contribution of Vc Acnt and Gov Eff is low. The country has made significant efforts towards improving the governance initiatives necessary for growth. For example, the country joined the Open Governance Initiative in 2011, which is an international initiative of 75 countries, founded by Brazil, Mexico, Norway, the Philippines, Britain, and the USA, with a mandate to improve public sector governance and encourage civil society participation in making governments more accountable (Adeleke, 2017). South Africa's 2016 report highlights accountability challenges, especially implementing and mainstreaming public-service anti-corruption laws. Notable is a failure to provide major commitments, such as schools' connectivity, rights, and responsibilities campaign, a platform for citizen participation in government, service delivery improvement forums, and the accountability and consequences framework (Adeleke, 2017).

**Table 5.** Food Imports analysis

Model 5: Food Imports (FI): Selected Model K=100 000 ( $R^2=0,6213$ ) F=3,2811

Variable	Correlation	VIF	Eigen Value	EV Condition	Standardised Coefficient
Vc Acnt	-0,549856	9,0971	3,339641	1,00	-0,0768
Polit Stab	0,252277	3,8193	1,266778	2,64	-0,0946
Gov Eff	-0822138	5,3501	0,919396	3,63	-0,3564
Reg Qual	-0,743319	2,4553	0,281147	11,88	-0,3638
Rul Law	-0,426675	1,3430	0,123281	27,09	-0,2231
Contr Crpt	-0,820426	6,1151	0,069759	47,87	-0,2250

Source: Author iterations from NCSS 2020

In model 5,  $k=1\ 000\ 000$ , Governance indicators explain 62% of the FI variance, which is a strong relationship. The correlation matrix explains the negative association between FI and all Governance indicators, except for Polit Stab. The VIF, EV of less than 10, and the EV condition less than 100 show an absence of multicollinearity in the model. The model fits well with the data, with a low F statistic of 3,2.

A negative relationship exists between FI and all governance indicators. Moderate contributions emanate from Gov-Eff and Reg Qual and similarly Rul Law and Contr Crpt. A unit change in Gov Eff, Reg Qual, Rul Law, and Contr Crpt will cause a decline in FI by between 22% to 36%. Low contributions are reported from Vc Acnt and Polit Stab. A 1-unit decline in Vc Acnt and Polit Stab will cause a less than 9% decline in FI.

The results are presented to reflect on the food security status of South Africa. The country is a net exporter of food, an indication of stability. For example, in the 2017/2018 season, the country imported about US\$7.7 billion in agriculture and food

products, against US\$11,1 billion exports during the same period (Export-Gov, 2019). In the form of tariffs and protectionist measures in key food industries, government regulatory measures promote the local food industry. For example, the government has implemented anti-dumping and safeguard measures through the International Trade and Administration Commission to protect the poultry industry from dumping and cheap poultry imports. The consequences can be traced back to the 2017 poultry trade clash between the USA and South Africa. The import duty on whole chickens was increased to 87% and that of chicken portions to 37%. (Department of Trade and Industry, 2019; Lowman, 2019).

## 6. Conclusions

The article addressed the question, how does good governance affect South Africa's food security? Consequently, the article addressed the sub-questions:

- What is the prevailing food policy framework in South Africa?
- What does the literature say about the relationship between food security and governance?

The article utilised the RRM technique to capture multiple latent FS and Governance indicator variables, a method not previously explored in studies governance. The literature supports the article findings on food security governance challenges in the country. (Koch, 2011, Nkwana, 2017). Thus, it justifies the appropriateness of the utilised method.

The main conclusion is that, despite the far-reaching goals of improving food security through good governance, elements of bad governance are still present within the country's food sector, affecting the country's food and nutrition security. The analysis shows that this is due to:

- Corporate corruption incidences, evidenced by the Zondo Commission of enquiry, among others. These have influenced the equitable distribution of food resources necessary to cushion the population against food insecurity.
- Poor food policy design and implementation.
- Government ineffectiveness (service delivery, quality of service) in the distribution of food resources, for example, the Basic Education Food distribution system.
- Less contribution on voice and accountability, as reflected in rights advocacy, lobbying, and exercise of rights in improving the functioning of government and the way decisions are made.
- Insufficient access to knowledge and resources to make the most appropriate decisions on nutrition and safe diets.

Although it will be challenging to address all the governance challenges affecting the South African food system, the South African government needs to consider the

following policy measures: First; Development of a compendious food security framework targeting agriculture productivity, societal inclusion, the emancipation of women in grassroots areas, and the overall improvement in dietary intake in poor communities. Second, formulate measures to increase the audience of lobbying groups and government-funded focus group discussions to learn of the food security and nutrition challenges facing poor households and the possible solutions. Finally; Reduce corruption by initiating transparency and accountability in all activities related to food security. If an individual is reported to be involved in corrupt activities or violates ethics and moral principles, they should account to the integrity committee or face prosecutorial processes, should they fail to offer an acceptable explanation.

**Conflicts of interest:** the author declares non-conflict of interest.

## References

- Adeleke, F. (2017). South Africa has work to do to make government more accountable. Retrieved from <https://mg.co.za/article/2017-01-11-south-africa-has-work-to-do-to-make-government-more-accountable>
- Akanle, O., Adesina, J., & Adefolake, O. (2017). Gender Paradoxes and Agricultural Monopoly in Nigeria: Implications for Policy and Food (IN) Security in Africa. *Gender & Behaviour*, 15 (3), 9665-9677.
- Aliber, M & Cousins, B. (2013). Livelihoods after Land Reform in South Africa, *Journal of Agrarian Change* 13 (1), 140–165.
- Aurino, E. (2013). Measuring Food Security: A Structural Equation Approach. Sixth International Conference on Agricultural Statistics.
- Battersby, J & Peyton, S. (2014). The Geography of Supermarkets in Cape Town: Supermarket Expansion and Food Access, *Urban Forum*, 25(2), 153– 164.
- Bollen, K. (1989). *Structural Equations with Latent Variables* [Hardcover]. John Wiley and Sons.
- Boyd, M & Wang, H. (2011). The role of public policy and agricultural risk management in food security Public policy: implications for food security. *China Agricultural Economic Review*, 3(4).44-59.
- Brinkman H, & Hendrix C. (2011). Food insecurity and violent conflict: causes, consequences, and addressing the challenges: World Food Programme. Occasional paper no 24. Retrieved from <https://ucanr.edu/blogs/food2025/blogfiles/14415.pdf>
- Candel, J. (2014). Food security governance: a systematic literature review. *Food Security*. 6(4), 585-601.
- Crouth, G. (2018). New food safety regulations imminent. Retrieved from <https://www.iol.co.za/pretoria-news/new-food-safety-regulations-imminent-13904842>.
- Department of Trade and Industry, (2019). Government intervenes to save the poultry industry Retrieved from <http://www.thedti.gov.za/editmedia.jsp?id=5780>
- Department of Social Development (DSD). (2019). Social Grant Fraud Syndicate Take down. Retrieved from <http://www.sassa.gov.za/index.php/newsroom/204-social-grant-fraud->



syndicate-take-down.

- Drimie, S & Ruysenaar, S. (2010). The Integrated Food Security Strategy of South Africa: An Institutional Analysis, *Agrekon*, 49 (3), 316–337.
- Du Toit, A. (2009). Adverse Incorporation and Agrarian Policy in South Africa, Or, How Not to Connect the Rural Poor to Growth, Paper Presented at BASIS Conference Escaping Poverty Traps: Connecting the Chronically Poor to Economic Growth, Washington, DC (February 26–27).
- Duncan J. (2015). Global food security governance: Civil society engagement in the reformed Committee on World Food Security: Routledge.
- Economic Freedom Fighters (EFF). (2016). Election Manifesto 2014. Retrieved from <http://effighters.org.za/election-manifesto/>
- Export-Gov. (2019). South Africa- Agriculture Sector. Retrieved from <https://www.export.gov/article?id=South-Africa-agricultural-equipment>
- FAO, IFAD. (2015). The state of food insecurity in the world 2015—meeting the 2015 international hunger targets: taking stock of uneven progress. FAO, Rome, 56.
- Family Health International. (2018). Governance, Agriculture and Food Security: Catalysing Integration. Retrieved from [www.fhi360.org/civil-society](http://www.fhi360.org/civil-society)
- Field, A. (2005). Discovering statistics using SPSS: (and sex, drugs and rock ‘n’ roll). London: SAGE.
- Food and Agriculture Organization of the United Nations (FAO). 2016. Mobilizing resources to fight hunger. Rome, Italy: FAO; ND.
- Food and Agriculture Organisation, (FAO). (2019). Food regulations. Retrieved from <http://www.fao.org/food/food-safety-quality/capacity-development/food-regulations/en/>
- Food and Agriculture Organisation, (FAO). (2021). The State of Food Security and Nutrition in the World 2021. Retrieved from <http://www.fao.org/documents/card/en/c/cb4474en>
- Giménez, E. H. & Shattuck, A. (2011). Food Crises, Food Regimes and Food Movements: Rumbblings of Re- form or Tides of Transformation? *Journal of Peasant Studies*, 38(1): 109–144.
- Gordhan, P. (2018). State Capture and corruption are the result of unleashing the worst of human instincts. Retrieved from <https://www.dailymaverick.co.za/article/2018-11-19-state-capture-and-corruption-are-the-result-of-unleashing-the-worst-of-human-instincts-gordhan/>
- Hamann, R. (2011). The Role of Business and Cross-Sector Collaboration in Addressing the ‘Wicked Problem’ of Food Insecurity, *Development Southern Africa*, 28, 579–594.
- Haysom, G. (2015). Food and the city: Urban scale food system governance. *Urban Forum*, 26(3), 263–281.
- Haysom, G. (2021). Integrating Food Sensitive Planning and Urban Design into Urban Governance Actions. *Urban Forum* 32, 289–310. <https://doi.org/10.1007/s12132-021-09417-9>
- Health Professional Councils of South Africa. (HPCSA) (2016). Dietetics & Nutrition News. Retrieved from <https://www.hpcsa.co.za/uploads/editor/UserFiles/DnBnews.pdf>
- Hendrix, C. & Brinkman H-J. (2013). Food insecurity and conflict dynamics: Causal linkages and complex feedbacks. *Stability: International Journal of Security and Development*. 2013; 2(2): 42–67.

- Hoerl, A., Kannard, R. & Baldwin, K. (1975). Ridge regression: some simulations, *Communications in Statistics*, 4:2, 105-123, DOI: 10.1080/03610927508827232
- Jana, S. & Karmakar, A. K. (2015). Globalisation, governance and food security-the case of BRICS in R.C Das (Ed), *Handbook of Research and Globalisation, Investment and Growth-Implications of Confidence and Governance*. Doi:10.4018/978-1-4666-8274-0.ch014.
- Joreskog, K. (1973). A General Method for Estimating a Linear Structural Equation System. In A.S. Goldberger and O.D. Duncan (Eds), *Structural Equation Models in the Social Sciences*, Seminar Press, New York.
- Joreskog, K, & Goldberger, A. (1975). Estimation of a Model with Multiple Indicators and Multiple Causes of a Single Latent Variable, *Journal of the American Statistical Association*, 70(3), 631–639.
- Kaplan, D. (2009). *Structural Equation Modelling: Foundations and Extensions* (2nd ed.) Thousand Oaks, CA: SAGE.
- Koch, J. (2011). The Food Security Policy context in South Africa. Retrieved from [http://www.ipc\\_undp.org/pub/IPCCountryStudy21.pdf](http://www.ipc_undp.org/pub/IPCCountryStudy21.pdf)
- Kirsten, J. (2012). The Political Economy of Food Price Policy in South Africa. Working Paper 2012/102 (Helsinki, Finland: United Nations University: UNU- WIDER.
- Kline, R. (2011). *Principle and Practices of Structural Equation Modelling*. Third Edition. New York: The Guilford Press.
- Krishnakumar, J. (2007). Going Beyond Functionings to Capabilities: An Econometric Model to Explain and Estimate Capabilities. *Journal of Human Development*, 8(1), 39- 63.
- Kuklys, W. (2005). The Measurement of Functionings Achievement: Structural Equation Models as an Alternative. In W. Kuklys (ed.). *Amartya Sen's Capability Approach: Theoretical Insights and Empirical Applications*. Berlin: Springer.
- Ledger, T. (2016). Power and governance in agri-food systems: key issues for policymakers. Working Paper. Trade and Industrial Policy Strategies. [file://Working\\_Paper\\_Power\\_and\\_governance\\_in\\_agri-food\\_systems\\_March\\_2016.pdf](file://Working_Paper_Power_and_governance_in_agri-food_systems_March_2016.pdf)
- Lowman, S. (2019). Imported chicken tariffs: A boom for big business, bust for life-saving small – Unati Speirs. Retrieved from <https://www.biznews.com/sa-investing/2019/05/23/tariff-imported-chicken-business>
- Makwela, M. (2018). Better governance can enhance an inclusive and just food system in South Africa. Retrieved from <https://www.bizcommunity.com/Article/196/650/176665.html>
- McCandless, E. (2011). *Peace Dividends and Beyond: Contributions of administrative and social services to peacebuilding*. United Nations Thematic Review for the Peacebuilding Support Office, New York.
- McKeon, N. (2011). *Global governance for world food security: a score card four years after the eruption of the “food crisis.”* Berlin, Germany: 2011.
- Mupindu, W. (2015). The challenges of food security policy and food quality in Zimbabwe. *African Journal of Public Affairs*, 8(2), 90-102.
- Nahman, A., De Lange, W., Oelofse, S. & Godfrey, L. (2012). The Costs of Household Food Waste in South Africa, *Waste Management*, 32(11), 2147– 2153.
- Nahman, A & De Lange, W. (2013). *Costs of Food Waste Along the Value Chain: Evidence*

- from South Africa, *Waste Management*, 33 (11): 2493–2500.
- Napoli, M. (2011). Towards a Food Insecurity Multidimensional Index. Universita Degli Studi, Unpublished Master's Thesis.
- National Planning Commission. (2012). National Development Plan 2012-2030. The Presidency, South Africa.
- NCSS. (2019). Chapter 335 Ridge Regression. Retrieved from [https://ncss-wpengine.netdna-ssl.com/wp-content/themes/ncss/pdf/Procedures/NCSS/Ridge\\_Regression.pdf](https://ncss-wpengine.netdna-ssl.com/wp-content/themes/ncss/pdf/Procedures/NCSS/Ridge_Regression.pdf)
- Nkwana, H. M. (2017). A multisectoral public policy framework for food security in South Africa. Unpublished PhD Dissertation. University of Pretoria.
- O'Keefe, P., Crashaw, B., Forsythe, M. & Heider, C. (2009). Full report of the evaluation of the Liberia PRRO 10454.0. Rome: WFP.
- OECD, FAO, UNCDF. (2016). Adopting a Territorial Approach to Food Security and Nutrition Policy. Paris: 2016.
- Osabohien, U. M. & Osabuohien, (2020). Accountability in agricultural governance and food security in Nigeria. *Brazilian Journal of Food Technology*, 23, e2019089. <https://doi.org/10.1590/1981-6723.08919>
- Paes-Souza, R & Vaitsman, J. (2014). The Zero Hunger and Brazil without Extreme Poverty programs: a step forward in Brazilian social protection policy. *Cien Saude Colet*. Nov; 19(11), 4351-60.
- Pereira, L. & Drimie, S. 2016. Governance Arrangements for the Future Food System: Addressing Complexity in South Africa, *Environment: Science and Policy for Sustainable Development*, 58(4), 18-31.
- Pereira, L. & Ruysenaar, S. (2012). Moving from traditional government to new adaptive governance: The changing face of food security responses in South Africa. *Food Security*, 4(1), 41-58.
- Pereira, L. & Drimie, S. (2016). Mapping Domains of Food Access and Consumption: A Conceptual Tool for Appreciating Multiple Perspectives Within Food System Governance, Colloquium paper No. 33, Global governance/politics, climate justice & agrarian/social justice: linkages and challenges, 4-5 February 2016, International Institute of Social Studies (ISS), The Hague, The Netherlands.
- Pingali, P. (2002). Reducing Poverty and Hunger: The critical role of financing for rural development, food & agriculture. *International Conference on Financing for Development*.
- Rakotoarisoa, M., Lafrate, M. & Paschali, M. (2012). Why has Africa become a net food importer? Explaining Africa agricultural and food trade deficits. Retrieved from [www.fao.org/3/a-i2497e](http://www.fao.org/3/a-i2497e).
- Ramphela, L. (2018). State Capture Inquiry. Zondo Commission: There's lack of corporation from government departments. Retrieved from <http://www.capetalk.co.za/articles/316068/zondo-commission-there-s-lack-of-corporation-from-government-departments>
- Rocha, C. (2009). Developments in national policies for food and nutrition security in Brazil. *Development Policy Review*, 27(1), 51-60.
- Ronquest-Ross, L-C., Vink, N. & Sigge, G. (2017). Application of science and technology by the South African food and beverage industry. *S Afr J Sci*. 2018;114(9/10), Art. #4757, 11 pages. <https://doi.org/10.17159/sajs.2018/4757>

- Sayeed, C. M & Pillay, P. (2013). Assessing South Africa's Food Security Strategy through a good governance lens. *Politeia*. 32(2), 84-104
- Schönfeldt, H. (2015). Food composition in policies and programmes in South Africa to address food security. Retrieved from [http://www.saafofost.org.za/Events/BRANCH\\_All/2015/Sep69SAAFoST/presentations/SAAFoST%20%20Food%20composition%20in%20policies%20and%20programmes%20in%20South%20Africa%20to%20address%20food%20security%20Schonfeldt.pdf](http://www.saafofost.org.za/Events/BRANCH_All/2015/Sep69SAAFoST/presentations/SAAFoST%20%20Food%20composition%20in%20policies%20and%20programmes%20in%20South%20Africa%20to%20address%20food%20security%20Schonfeldt.pdf)
- Stat Soft. (2019). Structural Equation modelling. Retrieved from <http://www.statsoft.com/textbook/structural-equation-modeling>
- Sunil, R. (2015). 7 Regression techniques you should know. Retrieved from [www.analyticsvidhya.com](http://www.analyticsvidhya.com). (04. 08. 2019).
- Suttie, D. & Hussein, K. (2015). Territorial approaches, rural-urban linkages, and inclusive rural transformation. Rome: IFAD.
- SWAC/OECD (2021), Food system transformations in the Sahel and West Africa: implications for people and policies, Maps & Facts, no. 4, April 2021.
- Tirivangasi, H. M. (2018). Regional disaster risk management strategies for food security: Probing Southern African Development Community channels for influencing national policy, *Jàmbá: Journal of Disaster Risk Studies*, 10(1), a468- a482.
- Van de Merwe, M. (2017). Analysis: Nutritional stunting and why SA is coming up short. Retrieved from <https://www.dailymaverick.co.za/article/2017-05-02-analysis-nutritional-stunting-and-why-sa-is-coming-up-short/>