

The impact of demographic variables on value-added tax compliance in South Africa

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Abstract

Research into the impact of demographic variables – including gender, age, formal education and tax knowledge – on tax compliance has produced mixed results. This article reports on an online between-subjects experiment conducted with individuals owning/managing small businesses to determine the impact of such variables on tax compliance behaviour in South Africa, specifically when there are changes in the VAT rate.

The study finds that before there are changes in the VAT rate, gender, education and tax knowledge have an effect on tax compliance decisions. By way of contrast, when there is a change in the VAT rate (specifically an increase), the only demographic variable that is found to have a significant effect on tax compliance is education.

The results of the study are both confirmatory and innovative and provide useful further evidence for tax policy-makers, administrators and researchers on the impact and implications of demographic variables on tax compliance in a developing country setting.

Keywords: demographic variables, tax compliance, small business owners/managers, VAT rate, experiment

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1. INTRODUCTION

‘Taxes are the lifeblood of government and no taxpayer should be permitted to escape the payment of his just share of the burden of contributing thereto.’
(Arthur Vanderbilt, in James, 2015).

Value-added tax (VAT) is one of the main tax revenue streams globally and is applied in more than 170 countries and territories (Organisation for Economic Co-operation and Development (OECD), 2020). It is an indirect tax that is collected based on consumption and is a self-declared tax where suppliers need to collect the VAT from the consumers (by including the VAT in the selling price) and pay it over to the revenue authorities (South African Revenue Service (SARS), 2015). VAT is a key component of South Africa’s tax mix and contributes 24.5% of its total tax revenue received (National Treasury and SARS, 2018, p. viii).

In order to increase tax revenue collection, the VAT rate in South Africa was increased from 14% to 15%, effective from 1 April 2018 (Gigaba, 2018). Similarly, countries such as Sri Lanka are raising VAT rates again to meet debt repayments, after the VAT rates were cut during the Covid-19 pandemic (Caragher, 2022). An increase in the VAT rate would typically be expected to lead to an increase in tax revenue; however, if more non-compliance emerges than before, less tax revenue may be collected. An increase in VAT has two potentially opposing effects: the mechanical effect which leads to an increase in VAT revenue and the disincentive behavioural effect which reduces VAT revenue. The possibility of VAT non-compliance is additional to the disincentive effect.

Tax non-compliance poses a substantial risk to all governments due to revenue losses, resulting in the inability to provide necessary public goods and services. A key issue identified from the literature is that certain groups within demographic variables are more non-compliant than others. Different demographic variables may influence tax compliance behaviour, and four broad categories are principally addressed in this study: gender, age, formal education and tax knowledge. Factors affecting tax compliance behaviour do not necessarily act in isolation, and thus, the interrelationship between the demographic variables is also explored.

The broad research question guiding this study is: to what extent do demographic variables impact the VAT compliance of individuals who are small business owners/managers when a change in the VAT rate is involved? The effect of demographic variables on tax compliance was considered both before and after VAT rate changes. The direction and magnitude of the change in the VAT rate and the interrelationship with demographic variables were therefore considered.

The aim of the study is to analyse the impact of demographic variables on VAT compliance in the context of a rate change. The focus is on individuals owning/in managing positions of small business entities in South Africa. A business is classified as small when its gross income is less than ZAR 20 million¹ in a 12-month period (section 12E(4)(a) of the *Income Tax Act* 58 of 1962). SARS has identified the small business sector as a risky area due to the missing trader problem and due to low tax

¹ ZAR 20 million was equivalent to USD 1,410,290 on 1 October 2018, which was during the time when the experiment the subject of this study was conducted: see Oanda, ‘Currency converter’, <https://www1.oanda.com/currency/converter/>.

registrations. SARS subsequently indicated that there would be an increased focus on VAT in the small business sector and that a larger portion of small businesses in general would be audited (SARS, 2012, 2017). For this reason, the study focused only on small business entities.

There are a number of contributions made by this study. The first contribution is at a theoretical level, where the study adds to the limited body of knowledge of VAT compliance relative to income tax compliance. Further, the study expands on the limited knowledge, if any, about the impact of VAT rate changes on VAT compliance, taking the demographics of individuals owning/managing small business entities into account. The limited knowledge available about tax compliance in an African country is also expanded upon. The data collection method, being an experiment, also adds to the various other strategies used in prior research, and it is considered it overcomes the problem of taxpayer dishonesty due to the hypothetical scenario provided and anonymity of the collection procedure. There are also contributions on a more practical level, taking into consideration the pressure of raising the VAT rate in South Africa and elsewhere: the results of the study should assist policy-makers in identifying non-compliant groups, permitting greater audit focus to be shifted to these groups. Further, the revenue authority could target their deterrence nudges² more specifically to those demographic groups which are identified to be more non-compliant (Antinyan & Asatryan, 2019).

The primary data was collected online via an experimental method and was analysed quantitatively to determine the effect of the independent variables (a change in the VAT rate and various demographic variables) on the dependent variable (tax compliance behaviour).

The study finds that before there are changes in the VAT rate, gender, education and tax knowledge have an effect on tax compliance decisions. By way of contrast, when there is a change in the VAT rate (specifically an increase), the only demographic variable that is found to have a significant effect on tax compliance is education.

The next sections explore the literature informing this study (section 2) and the research methodology (section 3). The findings are then analysed and discussed in section 4, followed by concluding remarks in section 5 highlighting limitations and possible areas for future research.

2. LITERATURE REVIEW

A major research approach dealing with tax compliance is the economic deterrence theoretical approach. This approach adopts as its fundamental premise the notion that rational persons will wish to maximise their earnings and that they will weigh the possibility of successfully evading taxes against the probability of being caught and punished (referred to as the expected utility theory) (Allingham & Sandmo, 1972; Hamid, 2013). This approach considers a situation rationally and ignores normative issues relating to what is right and wrong (Wenzel, 2005).

² Deterrence nudges such as messages about audits and penalties could be effective in increasing tax compliance and in turn, tax revenue collection in the short run. These messages should have a positive effect if sent to the right taxpayers. Nudges are relatively easy and low-cost to implement (Antinyan & Asatryan, 2019).

One of the economic deterrence factors identified as influencing tax compliance is tax rates. Some studies conclude that there is a positive relationship between the increase/decrease in the tax rate and a decrease/increase in tax compliance or tax revenue collection (Allingham & Sandmo, 1972; Alm, Jackson & McKee, 1992; Ottone, Ponzano & Andrighetto, 2018) whereas others have found that a higher marginal tax rate decreases tax evasion (Feinstein, 1991; Yitzhaki, 1974). Allingham and Sandmo's model was amended by Yitzhaki (1974), making the penalty payable dependent on the unreported tax, not the unreported income and found that in certain circumstances an increase in the tax rate should increase compliance and lead to individuals declaring more income.

Most of the studies on factors influencing tax compliance relate to income tax; only a limited number of studies consider tax compliance in the context of VAT (Kosonen & Ropponen, 2013; Naritomi, 2019). Moreover, the majority of these studies have been conducted in developed countries – mostly the United States of America (USA), European countries, Australia and New Zealand. A limited number of studies have been conducted in developing countries such as Brazil, China, Indonesia and Malaysia, with studies related to developing African countries including Nigeria, Ghana, Kenya, Uganda and Tanzania (Ali, Fjeldstad & Sjursen, 2014; Carsamer & Abbam, 2020; Mascagni & Santoro, 2018). Studies specifically relating to South Africa have been conducted by Alderman and Del Ninno (1999); Erero (2015); Go et al. (2005); Jansen and Calitz (2017); Theron (2016); and van Oordt (2016).

The behavioural effect of changes in the VAT rate on tax compliance is largely unknown. Furthermore, limited studies determining the effect of demographic variables on tax compliance behaviour have been conducted in Africa. For these reasons, this study's aim is to focus on the impact of demographic variables on VAT compliance, also taking into account changes in VAT rates. More particularly, this study focuses on four specific demographic variables: gender, age, formal educational level and tax knowledge. These are now discussed in more detail.

Gender

The taxpayer's gender has been shown to have an effect on the level of tax compliance (D'Attoma, Volintiru & Steinmo, 2017; Hofmann et al., 2017; Richardson & Sawyer, 2001). Several studies on individuals' tax compliance have concluded that females tend to be more opposed to tax evasion and more compliant than males (Carsamer & Abbam, 2020; D'Attoma et al., 2017). This may be due to the fact that 'women feel more enforced to pay taxes' (Kogler, Muehlbacher & Kirchler, 2013, p. 14) and that positive rewards seem to act as a motivator for females (Brockmann, Genschel & Seelkopf, 2016).

However, other research also suggests that the finding that females are more inclined to be compliant is not conclusive. Some studies state that males are the more compliant gender (Friedland, Maital & Rutenberg, 1978; Kirchler & Maciejovsky, 2001), while others have concluded that gender does not necessarily correlate with tax evasion or that the trend that females are more compliant than males is diminishing (Anderhub et al., 2001; Putri & Venusita, 2019; Shafer & Wang, 2018).

The empirical evidence relating to the role of gender on tax compliance therefore generally suggests that females are likely to be more compliant than males, although the outcome is not always clear, and qualifications to this general finding can be found.

Age

In general, the studies on individual taxpayer compliance argue that older taxpayers tend to comply more than their younger counterparts (Grasmick & Bursik, 1990; Hasseldine, Kaplan & Fuller, 1994). The young are less supportive of the progressive tax system than the old, and the attitudes of the young are also more accepting towards non-compliance than are the attitudes of the old (Jurney, Rupert & Wartick, 2017). Possible reasons for this are that the old have greater financial stability, possibly earning more income than the young due to experience. They are also more dependent on public goods and services and typically have more experience with business and revenue authorities and therefore gain more knowledge about tax law, which may be associated with a higher level of tax compliance (Hofmann et al., 2017). The young also seem to be less affected by deterrence measures such as the probability of being caught and punished (Becker, 1968).

There are, however, studies that have found no statistically significant correlation between age and tax compliance (Collins, Milliron & Toy, 1992). Moreover, the interaction of age with other factors and the effect these have together on tax compliance should not be ignored. Song and Yarbrough (1978) found that individuals between the ages of 40 and 65 have strong ethical values regarding tax. As a result, these middle-aged taxpayers tend to be more compliant than the young (in this case, those younger than 40) and also more compliant than those who are older than 65.

The old tend to be more compliant than the young (Carsamer & Abbam, 2020). However, age does not always create a willingness to pay tax, as no matter how old a taxpayer is, he/she will not comply if he/she does not have a sense of responsibility to pay tax (Wijayanti et al., 2020).

Although the results are inconclusive, the majority of studies indicate that older taxpayers tend to be more compliant than those who are younger.

Education

Education may relate to two distinct ideas. The first is formal education in terms of obtaining secondary or tertiary qualifications, such as completing high school or obtaining a university degree, regardless of the field in which the qualification is obtained. The second relates more to the specific tax knowledge a person possesses and refers to the ability to understand and then to comply (or not comply) with the tax laws (Jackson & Milliron, 1986). The first of these concepts is dealt with under this heading, 'education', while the second (tax knowledge) is dealt with as a separate variable immediately after 'education'.

Studies with reference to formal educational qualifications indicate that tax compliance improves with higher education, since generally, a person with more formal education has the know-how to comply, regardless of the content of the education (Inasius, 2019; Song & Yarbrough, 1978). However, there is also evidence that people with more formal education can identify loopholes and may in fact be less compliant (Hofmann et al., 2017). The higher income earners tend to be the more qualified persons, and, as a result, they are also the people paying more taxes progressively. High-income earners may thus view tax evasion more favourably (McGee, 2012).

From the perspective of studies done on small businesses, secondary and tertiary education, in general, seem to improve the tax compliance of small and medium enterprises (Carsamer & Abbam, 2020).

Tax knowledge

Care should be taken not to assume that a more (educationally) qualified person has better tax knowledge, as the education in question might have dealt with many different topics or fields (Kirchler, 2007; Richardson & Sawyer, 2001). Although some individuals are highly qualified, they may not have sufficient knowledge to comply with tax obligations under a self-assessment system. Thus, education and training specifically in the tax field are more likely to have a positive impact on tax compliance (Kwok & Yip, 2018; Loo & Ho, 2005). The study by Inasius (2019) indicated that, in general, tax knowledge does have some impact on tax compliance but that the effect is not significant.

Although tax knowledge could assist a person in knowing how to accurately calculate their tax liability, Richardson and Sawyer (2001) noticed that knowledge of evasion opportunities negatively impacts on compliance, as this facilitates non-compliance. Tax practitioners also need to decide very carefully when aggressive tax planning would be seen as ethical, and where it is pushing the boundaries (Field, 2017).

People who are less educated may comply less, as they might not know that they even need to register as VAT vendors, or they may make unintentional mistakes due to a lack of tax knowledge obtained through education (Hofmann et al., 2017; Kosonen & Ropponen, 2013; Mascagni & Santoro, 2018). Kirchler and Maciejovsky (2001) found that self-reported tax compliance increased where the respondents had a better knowledge of the legal principles, as these respondents deemed the tax system to be fairer. In South Africa specifically, more tax knowledge seems to cultivate a better tax compliance attitude, which, in turn, ensures improved tax compliance (Ali et al., 2014).

The empirical evidence relating to the role of education and tax knowledge in tax compliance is not always conclusive, and further research is thus necessary on these topics. A clearer distinction should also be made between education level in general and tax-specific knowledge.

To summarise the findings from the literature regarding the demographic variables, females tend to be more compliant than males, and those who are older are more likely to be compliant than the young. The effect of education and tax knowledge on tax compliance behaviour is less certain. Note, however, that most of the literature relates to individuals generally, and it is not necessarily specific to individuals who are in small businesses.

3. RESEARCH METHODOLOGY

A post-positivist approach was followed in the current study in determining causal relationships, accepting that reality is influenced by people's observations and sensations and that the results only indicate that something is probably true, not certainly true (Denzin & Lincoln, 2011; McKerchar, 2010; Scotland, 2012).

Obtaining valid data on the demographic variables that impact the VAT compliance behaviour of individuals who are small business owners/managers is challenging, as individuals may typically hesitate to be honest regarding their own or their business's

non-compliance (Alm et al., 1992). Quantitative research is typically performed under a positivist (and post-positivist) research philosophy and is often linked with experiments (Creswell, 2016; McKerchar, 2010; Saunders, Lewis & Thornhill, 2016). To ensure that the best possible data are collected, this study adopted a quantitative approach and data were collected using an online experiment to test the relationship between demographic variables and tax compliance before and after changes in the VAT rate. An experiment addresses the issue of dishonesty regarding tax compliance by sketching a hypothetical real-world scenario, removing the focus from the participant and placing it on a hypothetical person (Alm, 1991; Torgler, 2003). Nuisance factors can also be eliminated by an experiment's focusing only on the variable in question (Burtless, 1995). Another advantage of conducting an experiment is that the procedures are highly replicable. An experiment is deemed the most appropriate method of collecting primary data to determine the probable effect of one variable affecting another (Shadish, Cook & Campbell 2002).

As a result of the review of the literature relating to the effect of demographic variables on tax compliance behaviour, the following broad hypothesis was developed:

H₁: *Demographic variables affect amounts declared and associated tax compliance when there is a change in the rate at which VAT is levied.*

To address the gap in the available literature regarding changes in the VAT rate, the effect of demographic variables before and after the changes in the VAT rate was taken into account. To enable the study to test the effect of the various demographic variables on tax compliance behaviour, also considering the effects of changes in the VAT rate, the following more specific hypotheses were developed so far as individuals who are small business owners/managers are concerned:

- **H_{1A}:** *At the current standard VAT rate, females are more tax compliant than males.*
- **H_{1B}:** *Females are more tax compliant than males when there are changes in the VAT rate.*
- **H_{2A}:** *At the current standard VAT rate, those who are older are more tax compliant than those who are younger.*
- **H_{2B}:** *Those who are older are more tax compliant than those who are younger when there are changes in the VAT rate.*
- **H_{3A}:** *At the current standard VAT rate, the level of formal education attained affects amounts declared and associated tax.*
- **H_{3B}:** *The level of formal education attained affects amounts declared when there are changes in the VAT rate.*
- **H_{4A}:** *At the current standard VAT rate, the level of tax knowledge affects amounts declared and associated tax.*
- **H_{4B}:** *The level of tax knowledge affects amounts declared when there are changes in the VAT rate.*

A between-subjects online experiment following a pre-test and post-test design was conducted, involving four treatment groups that were confronted with a VAT rate change from the current 15% rate:

- those with a five-percentage-point decrease in the VAT rate (10%): the large decrease group;
- those with a one-percentage-point decrease in the VAT rate (14%): the small decrease group;
- those with a one-percentage-point increase in the VAT rate (16%): the small increase group; and
- those with a five-percentage-point increase in the VAT rate (20%): the large increase group.

The experiment commenced with questions to obtain the demographic profiles of the participants and their business entities, after which the participants responded to a hypothetical scenario by indicating the amounts they would declare on sales and purchases with a VAT rate of 15%. The participants were then randomly allocated by Qualtrics (an online instrument delivery service provider) to one of the four treatment groups and asked the exact same questions but this time with a new, hypothetical, VAT rate. Attention checks and questions regarding registration decisions were asked next, and the experiment concluded with questions regarding the participants' decisions in responding to the abovementioned scenarios.³

Participants were only eligible to participate in the experiment if they were classified as owners/managers of small business entities and if the entities for which they were owners/managers were able to register as VAT vendors in South Africa. Therefore, the participants were eligible to participate if their business's gross income was between ZAR 50 000⁴ and ZAR 20 million in a 12-month period (section 23(3)(b) of the *Value-Added Tax Act* 89 of 1991; section 12E(4)(a) of the *Income Tax Act* 58 of 1962).

Non-probability purposive sampling was applied to conduct three rounds of pilot testing of the substance of the experiment, and responses were received from 18 participants including academics or businesspersons (Leedy & Ormrod, 2015; Saunders et al., 2016). Their responses enhanced the readability and clarity of the experiment. Volunteer, convenience and snowball sampling were then used to recruit participants for the experiment. A link to the experiment was shared with friends and family of the conductor of the experiment using social media. Additionally, the Organisation Undoing Tax Abuse (OUTA) posted the link to the experiment on their Facebook page, and the South African Institute of Tax Practitioners (SAIT) posted the link to the experiment in newsletters sent to their members for three weeks. Further, e-mail addresses were obtained from LinkedIn, which is in the public domain, and the link to the experiment was e-mailed to 15,158 addresses. Everyone receiving the link could

³ A copy of the questionnaire used in the experiment is available at: <https://doi.org/10.25403/UPresearchdata.13713121>.

⁴ ZAR 50 000 was equivalent to USD 3,526 on 1 October 2018, which was during the time the experiment was conducted: Oanda, 'Currency converter', <https://www1.oanda.com/currency/converter/>.

thus decide to participate or not and were asked to forward the message containing the link to people who they thought were qualifying participants (Saunders et al., 2016).

Between June 2018 and January 2019, 557 responses were received, with only 131 valid and usable for the analyses. Responses were invalid where: participants did not agree to participate in the study (8); participants did not meet the qualifying requirements (based on the income level of the business and being in a management, decision-making position in the business) (211); the attention checks were answered incorrectly (46); the experiment was not sufficiently completed for comparative purposes (160); and the participants' comments clearly indicated that they did not understand the experiment and therefore did not answer appropriately (1). The participants were randomly allocated by Qualtrics to the various treatment groups, as set out in Table 1.

Table 1: Allocation to the Various Treatment Groups

Treatment group	Number of responses
Large decrease group (10%)	33
Small decrease group (14%)	30
Small increase group (16%)	34
Large increase group (20%)	34

A sufficient sample size was deemed to be between 15 and 30 participants per treatment group. The number of responses received per treatment group was therefore sufficient (Daniel, 2012; Hogan, Maroney & Rupert, 2013; Kim, Evans & Moser, 2005; Rupert, Single & Wright, 2003).

4. ANALYSIS OF RESULTS

Experiments are proven data collection instruments used to determine causal relationships between the independent variable (tax compliance behaviour) and dependent variables (VAT rates and demographic variables) (Leedy & Ormrod, 2015; Shadish et al., 2002). In this study, the extent to which demographic variables impact VAT compliance was considered, both before and after changes in the VAT rate.

The software package IBM SPSS Statistics 25 was used to analyse the data collected through the experiment. Descriptive statistics were obtained to analyse the data and associated correlations (Leedy & Ormrod, 2015). For the inferential statistics, the Pearson's Chi-Square⁵ test of independence and the Fisher Exact test were applied. Both tests were considered appropriate for testing the association between the demographic variables and tax compliance.⁶ The Fisher Exact test results are used in circumstances

⁵ Pearson's Chi-Square 'is a statistical test of association between two variables in which the expected values are compared with the observed values' (Acton et al., 2009, p. 348).

⁶ See [thebmj](https://www.bmj.com/about-bmj/resources-readers/publications/statistics-square-one/11-correlation-and-regression), <https://www.bmj.com/about-bmj/resources-readers/publications/statistics-square-one/11-correlation-and-regression>.

where the data do not meet the requirements of performing other tests.⁷ The current study falls within this category.

The reliability of the data refers to the ability of the study to obtain repetitive, consistent results when the experiment is replicated on the same subjects.⁸ The Cronbach alpha values were obtained to test the reliability of the data. The internal consistency of two sets of Likert-scale questions yielded Cronbach alpha values of 0.713 and 0.782, exceeding the threshold of 0.6 (Hair et al., 2010); the results are therefore deemed reliable.

Differences in responses collected over time were also observed to ensure the reliability of the data. The experiment was open from June 2018 to January 2019. The early responses were obtained from June 2018 to August 2018 and the late responses from October 2018 to January 2019. All participants had to report the amounts they would declare for sales and purchases in the 15% category. A t-test for independent groups was then done based on these amounts. The data were deemed reliable, as no statistically significant differences were found at the 5% level of significance between the early and the late responses, and it was therefore concluded that no external shocks or exogenous factors had affected the results obtained.

The experiment commenced with a number of demographic questions regarding the background of the individuals and the small business entities they owned/managed. The results were compared to relevant South African data to determine whether the sample obtained fairly represented the South African small business sector. It is evident from Table 2 that the results were representative for gender and age but not for education/qualifications. Any extrapolation to the general population should thus be made with caution.

⁷ Since one of the main assumptions for the validity of the Pearson's Chi-Square test is that no more than 20% of the cells should have expected frequencies less than five, the Fisher's Exact test is more appropriate in these cases: *ibid.* In the majority of cases, the cells had an expected frequency of less than five.

⁸ See Business Research Methodology, 'Research methodology', <https://research-methodology.net/research-methodology/reliability-validity-and-repeatability/research-reliability/>. See also Middleton (2019).

Table 2: Summary of Demographic Profile

Demographic	Sample	Comparison	Comparative from?	Representative?
Gender	Male: 58% Female: 42%	Male: 55% Female: 45%	Workforce	Yes
Age	20–35: 30% 36–50: 37% 51–65: 28% >65: 5%	<20: 0.4% 20–34: 24.4% 35–49: 46% 50–64: 24.9% >64: 4.3%	SMME owners	Yes
Education/ qualifications	Up to matric: 6% Post-matric: 24% Bachelor's: 44% Master's/Doctorate: 26%	Tertiary education: 21% Secondary education: 26% Less than secondary education: 53%	SMME owners	No

Source: Small Enterprise Development Agency (2019); Statistics South Africa (2018).

4.1 The effect of demographic variables on tax compliance

The study hypothesised that particular demographic variables of the participants may have implications for their compliance decisions. To determine whether there is an association between each demographic variable and tax compliance, the results from the amounts declared before and after the treatments were applied (decrease and increase in VAT rate groups) were considered. For this, the coding was done as follows: compliance⁹ for sales and purchases was indicated as a 1 where the participant was compliant and a 0 where the participant was non-compliant.¹⁰ The difference between the compliance results from the 15% category and the decrease in VAT rate treatment group or the increase in VAT rate treatment group was then determined. The result could be 0, meaning the participant remained compliant/non-compliant in both the initial scenario (15% VAT rate) and the appropriate treatment group in the follow-up scenario (with either a decrease or increase in the VAT rate); 1, meaning the participant was compliant in the 15% category but then became non-compliant in the treatment group; or -1, meaning the participant was not compliant in the 15% category but then became compliant in the treatment group.

Figure 1 illustrates the compliance levels for each of the demographic variables under consideration for both sales and purchases prior to any change in the VAT rate. It can be seen that the extent of compliance for sales is generally better than for purchases.

⁹ Compliance: Sales: ZAR 2,000,000 is declared. Purchases: ≤ ZAR 500,000 is declared.

¹⁰ Non-compliance: Sales: < ZAR 2,000,000 is declared. Purchases: > ZAR 500,000 is declared.

Furthermore, it is evident that: females tend to be more compliant than males; individuals between 51 and 65 years of age tend to be the least compliant, but those over 65 tend to be the most compliant; individuals with the lowest qualifications tend to be the least compliant; and those with the best VAT knowledge tend to be the most compliant.

Fig. 1: Compliance per Item per Demographic Variable (15% Category)

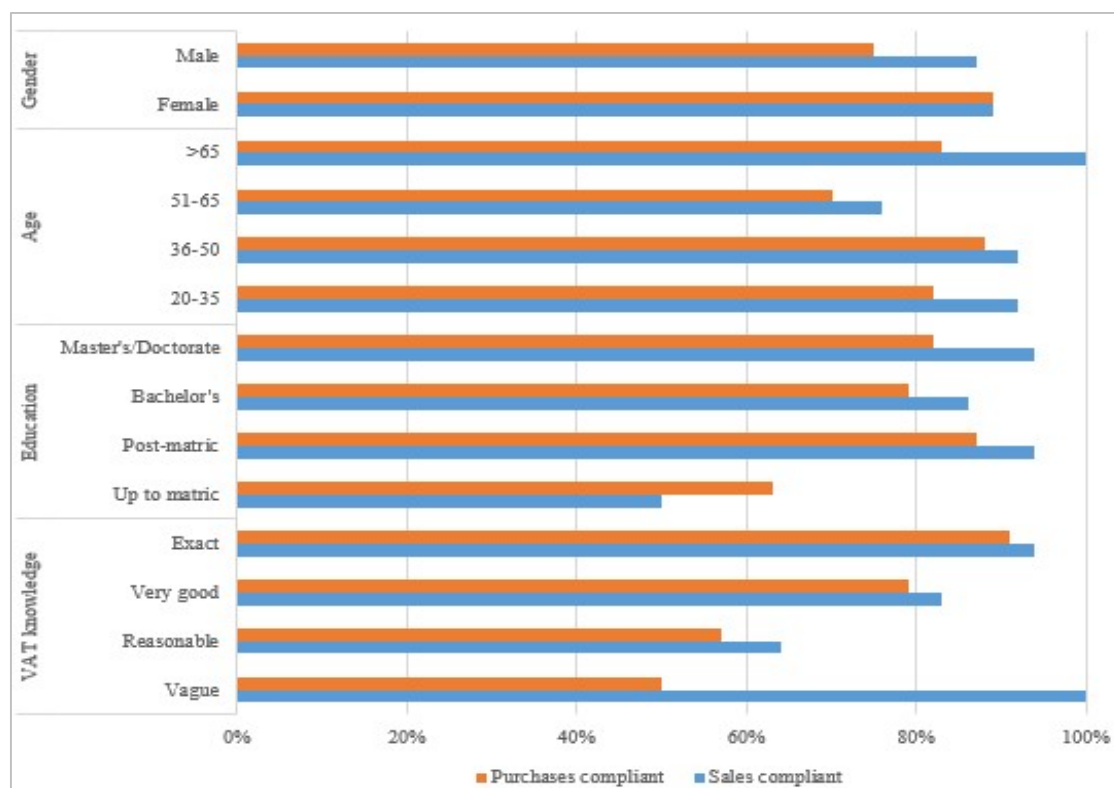


Figure 2 (sales) and Figure 3 (purchases) illustrate the compliance per item within each demographic variable after the change in VAT rate as a result of the treatment being applied. It is evident that after the treatments were applied, although the compliance levels mostly remained unchanged, when compliance levels did change, more individuals became non-compliant after the change in the VAT rate than those who became compliant.

Fig. 2: Compliance per Item per Demographic Variable for Sales after Treatment

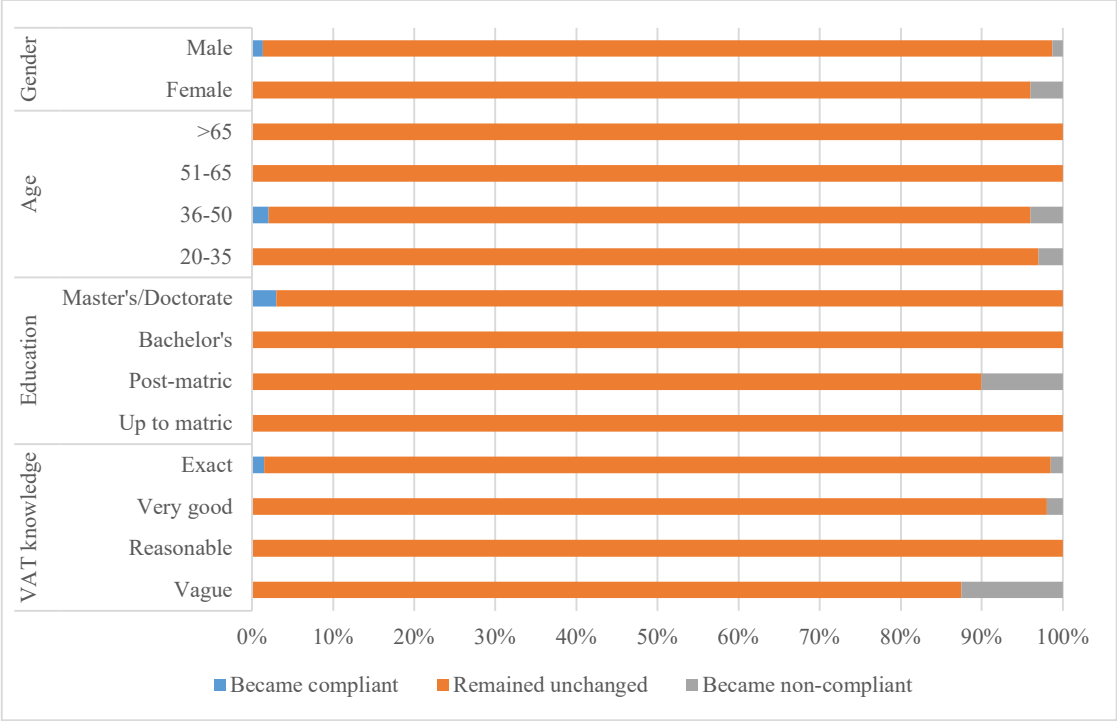


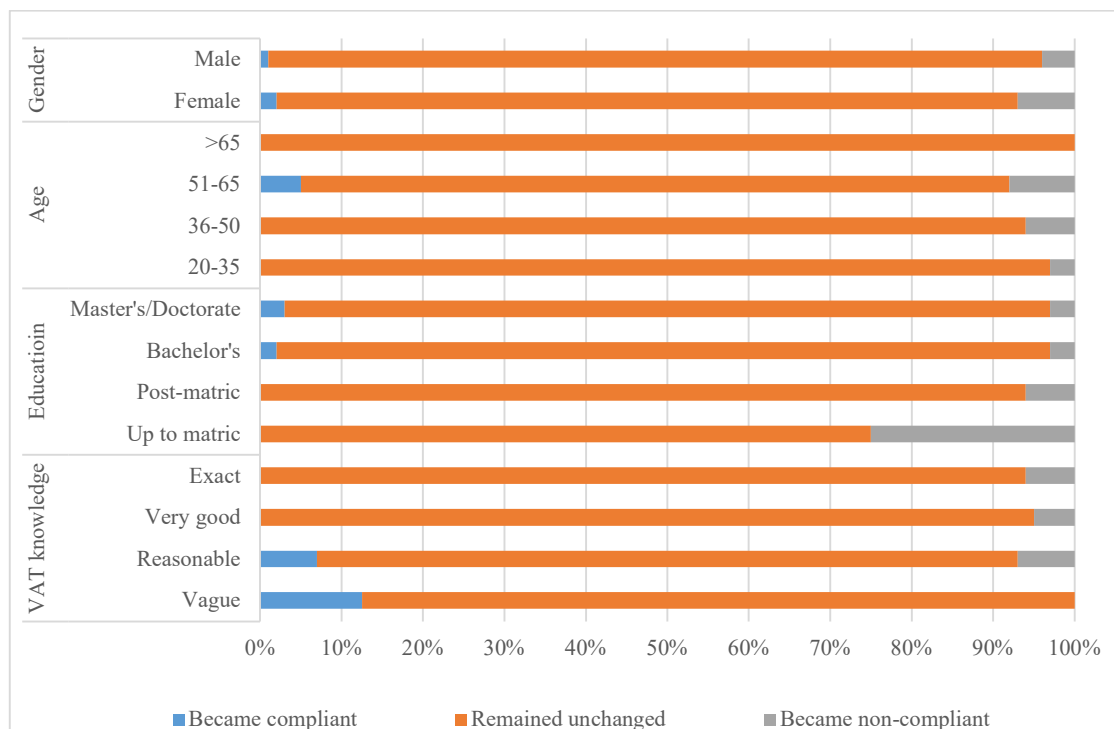
Fig. 3: Compliance per Item per Demographic Variable for Purchases after Treatment

Table 3 summarises the results of the Pearson's Chi-Square or Fisher Exact tests, where applicable, for association between the various demographic variables and tax compliance. The p -value indicates the significance of the results. The Cramer V values are also reported in Table 3 to show the strength of the association. Threshold values for Cramer V are: > 0.5 – high association, 0.3 to 0.5 – moderate association, 0.1 to 0.3 – low association and 0.0 to 0.1 – little, if any, association (Cohen, 1988).

Table 3: Pearson's Chi-Square or Fisher Exact for the Association between Various Demographic Variables and Compliance

Variables		Pearson's Chi-Square value	Fisher Exact test (if applicable)	Exact significance (p-value) (2-sided)	Cramer V
Before changes in VAT (15% category)					
Gender	Sales	0.15		0.791	0.034 ^{\$}
	Purchases	4.103		0.070*	0.177
Age	Sales		5.81	0.103	0.238
	Purchases		4.144	0.227	0.18
Education	Sales		9.525	0.015**	0.315 [#]
	Purchases	2.666		0.455	0.143
VAT knowledge	Sales		9.629	0.014**	0.297
	Purchases		13.982	0.002***	0.335 [#]
After changes in VAT					
Gender	Sales: Increase group		1.024	1	0.104
	Sales: Decrease group		No value	0.492	0.129
	Purchases: Increase group		2.574	0.258	0.194
	Purchases: Decrease group		1.871	1	0.178
Age	Sales: Increase group		4.853	0.92	0.147
	Sales: Decrease group		3.337	1	0.162
	Purchases: Increase group		4.22	0.864	0.16
	Purchases: Decrease group		8.143	0.133	0.211
Education	Sales: Increase group		9.301	0.063*	0.288
	Sales: Decrease group		3.37	0.587	0.201
	Purchases: Increase group		8.415	0.135	0.273
	Purchases: Decrease group		7.073	0.316	0.214
VAT knowledge	Sales: Increase group		8.904	0.177	0.295
	Sales: Decrease group		3.937	0.444	0.209
	Purchases: Increase group		6.754	0.366	0.245
	Purchases: Decrease group		8.846	0.214	0.316 [#]

* Significant at 10% level as $p < 0.1$ ** Significant at 5% level as $p < 0.05$ *** Significant at 1% level as $p < 0.01$

Strength of associations: \$ – little, if any; blank – low; # – moderate)

From the results, the following significant associations between the demographic variables and tax compliance *before* a change in the VAT rate are noted:

- gender (purchases declared) at a 10% level of significance;
- education/qualifications (sales declared) at a 5% level of significance, the association being moderate;
- VAT knowledge (sales declared) at a 5% level of significance; and
- VAT knowledge (purchases declared) at a 1% level of significance, the association being moderate.

The following significant association between the demographic variables and tax compliance *after* a change in the VAT rate is noted:

- education/qualifications (sales declared, when there is an increase in the VAT rate) at a 10% level of significance.

There are no significant associations with tax compliance for any of the other variables in any of the other situations after a change in the VAT rate (where there is a decrease in the VAT rate and/or where purchases are involved). It is an interesting observation that only education/qualifications appear to affect tax compliance behaviour when there is a change in the VAT rate.

Those demographic variables where a significant association was identified before and/or after a VAT rate change – namely gender, education/qualifications and VAT knowledge – are now discussed in more detail. The effect of age on tax compliance is not discussed further, as it was not evident that those who are older were more tax compliant than their younger counterparts. Hypotheses H_{2A} and H_{2B} were thus not supported regarding age.

4.2 Gender

For the scenario before a change in the VAT rate where purchases were declared, there is a low significant association between gender and tax compliance. Females were more compliant in declaring purchases than males, with 89% and 75% compliance, respectively.

The results thus show that gender does not generally affect tax compliance except in the case of purchases declared, where female participants were more compliant than male participants, supporting H_{1A} . The result that females tend to be more compliant than males supports the studies done by Brockmann et al. (2016), Carsamer and Abbam (2020), Damayanti and Supramono (2019), D’Attoma et al. (2017) and Kogler et al. (2013), as these studies also all found that males are more inclined to evade taxes and are thus more non-compliant than females.

Regarding amounts declared when there were changes in the VAT rate, no significant association between gender and tax compliance was noted; thus, hypothesis H_{1B} was not supported.

4.3 Education/qualifications

From the results of the 15% category (before changes in VAT), there is a moderately significant association between education/qualifications and tax compliance for sales declared, supporting H_{3A} . The participants with the lowest qualifications (no qualifications after matric) only complied by 50% in declaring sales. The participants with the highest qualifications (Master's and Doctorate) were the most compliant, with a compliance rate of 94.1%. The low compliance of the participants with the lowest qualifications could be due to a lack of knowledge about VAT legislation and what compliance entails.

Regarding sales declared when there was an increase in the VAT rate, there is a low significant association between education/qualifications and tax compliance. Although the majority of the participants' compliance status did not change (100% for those who had only completed matric or a Bachelor's), there were some changes in compliance for participants with a post-matric qualification and also for those with Master's or Doctorate degrees. Of the participants with a post-matric qualification, 15.4% became non-compliant, whereas 5.3% of those with a Master's or Doctorate became compliant. The increase in the non-compliance of the participants with a post-matric qualification was somewhat expected, as people do tend to maximise their profits and may therefore declare less in sales to decrease their VAT liability. Based on this argument, however, it was unexpected that participants with higher qualifications would become *more* compliant with an increase in the VAT rate. It was expected that compliance would either remain the same or decrease. The results, however, support H_{3B} in indicating that education levels do affect tax compliance.

There was variation between compliance in sales and purchases between the various treatment groups, but the participants with the lowest qualifications were consistently the least compliant. These results support the findings of Carsamer and Abbam (2020) which were likewise that participants who have a higher education are more compliant. However, a high qualification obtained does not necessarily imply a tax qualification. As Loo and Ho (2005) indicate, even though some participants may have a high(er) education, they might not possess the necessary tax knowledge to accurately complete their tax returns. Accordingly, if they lack tax knowledge, they could make unintentional errors (Kosonen & Ropponen, 2013).

4.4 VAT knowledge

For the scenario before a change in the VAT rate, an association between the perceived VAT knowledge and tax compliance for both sales and purchases declared was noted, supporting H_{4A} . For sales declared, there is a low significant association between perceived VAT knowledge and tax compliance. Although participants who indicated that they had a vague understanding of VAT were the most compliant in reporting sales at 100%, those with a reasonable VAT knowledge were only 64% compliant. The second most compliant participants, at 94%, indicated that they knew exactly how to calculate VAT; and they were followed, at 83%, by the participants who reported having a very good understanding of VAT.

For purchases declared, there is a moderately significant association between perceived VAT knowledge and tax compliance. A tendency for participants with the highest perceived VAT knowledge to be the most compliant (91%) and for participants with a vague VAT knowledge to be the least compliant (50%) was noted. This was expected,

as participants with a vague VAT knowledge probably do not know which purchases are allowed to be deducted.

The results indicating that VAT knowledge influences tax compliance support the findings of Kirchler and Maciejovsky (2001), Kwok and Yip (2018) and Song and Yarbrough (1978), who found that when individuals have a better knowledge of tax and higher levels of tax ethics, they are more compliant.

Regarding amounts declared when there were changes in the VAT rate, no significant association between tax knowledge and tax compliance was noted; thus, hypothesis H_{4B} was not supported. Although the results are not statistically significant, where there was an increase in the VAT rate, participants with the most VAT knowledge tended to become the most non-compliant. This was expected, as those with more VAT knowledge could potentially abuse the system and identify loopholes to minimise their VAT liability.

To establish the correlation between levels of education and perceived levels of VAT knowledge, a Kruskal-Wallis test was run due to the ordinal nature of the education data. From Table 4, it is evident that there is no statistically significant difference between levels of education and perceived levels of VAT knowledge.

Table 4: Test Statistics for Kruskal-Wallis: VAT Knowledge Perception

Total n	131
Kruskal-Wallis test statistic	5.634
Asymptotic significance	0.131
Result	Not significant

It is evident that VAT knowledge is not significantly dependent on level of education in general, supporting the findings of Kwok and Yip (2018) and Loo and Ho (2005) that education and training specifically in the tax field have a positive impact on tax compliance. Care should be taken, therefore, in assuming that a higher qualification in all cases would mean that a person has sufficient tax knowledge, as the qualification could be in a field that is completely unrelated to tax (Kirchler, 2007; Richardson & Sawyer, 2001).

When considering the mean ranks of the different groups as per Table 5, it can be deduced, however, that there is a tendency, as levels of education increase, for participants' perceived VAT knowledge to increase too, with a clear difference between VAT knowledge at matric level or lower and VAT knowledge at any tertiary education level. This supports the results of Inasius (2019) and Song and Yarbrough (1978), which indicate that tax knowledge improves with higher qualifications regardless of the field in which the qualifications are obtained.

Table 5: Mean Ranks: VAT Knowledge Perception

Ranks			
	Education	N	Mean rank
Knowledge	Matric or lower	8	38.44
	Post-matric	31	65.19
	Bachelor's	58	68.58
	Master's or Doctorate	34	68.82
	Total	131	

In summary, these analyses add to the body of knowledge already available on the possible effect of demographic variables on tax compliance, in combination with changes in a VAT rate. Indeed, the results may assist governments in focusing their attention for revenue collection on groups that tend to show higher levels of non-compliance.

5. CONCLUSION

Although prior empirical research has been conducted on demographic variables and changes in the tax rate, little empirical evidence from prior research has been obtained from a VAT perspective in an African country.

The results of the current experiment indicate that tax compliance is problematic for revenue collection, as some participants were not compliant even before there were any changes in the VAT rate. The correlation between the demographic variables and whether or not a participant complied before a change in the VAT rate shows that: females tend to be more compliant than males; the highest qualified in terms of levels of education are more compliant in declaring sales and are also relatively more compliant in declaring purchases than those with lower levels of education; and the better the perceived VAT knowledge, the higher the compliance regarding both sales and purchases.

When there is a change in the VAT rate, the only demographic variable that is deemed to have a significant effect on tax compliance is the level of education/qualifications for sales declared when there is an increase in the VAT rate. Education was expected to have an effect on tax compliance, as education can lead to more knowledge regarding available loopholes for tax evasion; yet it was also expected that higher qualified people would be more compliant, as they possibly have more knowledge on what the legal requirements are for tax compliance.

The increase in non-compliance by the participants with a post-matric qualification was somewhat expected, as people generally tend to maximise their profits and may therefore declare less in sales to decrease their VAT liability. Based on this argument, it was unexpected that participants with higher qualifications would become more compliant with an increase in the VAT rate.

As with all studies, this one has a number of limitations, but these limitations also lead to potential for future research. Only individuals who are owners/managers of small

businesses qualified to participate in the study, and thus, the views of participants are limited to the views of owners/managers of such small business entities. This does, however, provide more accurate results and insight into the tax compliance behaviour of this specific taxpayer group. Nevertheless, the experiment could be expanded in future research to test the effect of changes in the VAT rate on other types of taxpayer. Moreover, larger samples should be obtained to enrich the findings of the study.

The experiment adopted a simple design, and thus, complex market restructurings and other effects on prices after a change in the VAT rate were not taken into account. These restructurings could be built into a model for future research.

In addition, since only participants who had an electronic device and access to the internet were able to complete the experiment, there is a possibility that important data were not captured from other potential participants who did not have easy access to such resources. Researchers may therefore need to be creative in finding ways to include those who otherwise would be unable to participate in such a study because of technological limitations.

‘People who complain about taxes can be divided into two classes: men and women’.¹¹ Although many people may complain about taxes, a large number of people do remain tax compliant. Various demographic variables may influence a person’s tax compliance decisions, and when a government is aware of these influencing factors, more targeted programs can be implemented to ensure that the optimal amount of tax revenue is collected.

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¹¹ Anon., quoted at LDP, ‘Your selection of Budget 2019 tax calculators’, <https://ldp.co.za/your-selection-of-budget-2019-tax-calculators/>.

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