Temporal and spatial variation of income diversification strategies among rural households in South Africa

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Understanding temporal and spatial variations of income diversification is important for developing policies aimed at reducing rural poverty. This study applied Simpson Index of Diversity (SID) to panel data from National Income Dynamics Study from 2008 to 2017 to investigate these variations across four provinces of South Africa. Findings point to the importance of disaggregating when analysing household income diversification. Limpopo, KwaZulu-Natal and North West had higher SID than the aggregated index, while Eastern Cape had lower degree of diversification. Contrary to other studies, this study found provinces with the highest and lowest income not having the highest degree of diversification. Over time, households diversified more, with SID increasing from 0.16 to 0.23 by 2017. The study recommends supporting households diversify their income. Specifically, the study recommends support for agriculture in KwaZulu-Natal, Eastern Cape and Limpopo, while in North West, provincial government should promote business ventures to improve household resilience.

1. Introduction

Income diversification is a strategy used by households to multiply their sources of income or change the composition and proportions of the sources (Sultana et al. 2015; Wan et al. 2016). Rural households diversify their income sources as a way to reduce poverty, food insecurity and vulnerability to a range of shocks such as climate change (Dev et al. 2016; Wan et al. 2016; Djido & Shiferaw 2018; Wuepper et al. 2018). It is the most important and common livelihood strategy for rural households (Dimova & Sen 2010; Wan et al. 2016).

Globally, studies show that diversification of income by households, particularly those in rural areas, is the norm rather than the exception. In Africa, studies observed income sources to be a combination of primary agriculture and non-farming activities for smallholder farmers (Senadza 2012; Agyeman et al. 2014). Similarly, in China and India, studies found that households diversify their income sources away from agriculture to off-farm sources, particularly to cope with climate-change risks such as droughts and rainfall shocks (Wan et al. 2016; Ma & Maystadt 2017; Chuang 2019).

Income diversification patterns of households are dynamic and depend on various factors, such as households' demographic characteristics and economic opportunities available to the households. Consequently, the income diversification patterns of households would differ temporally, as resources and opportunities become more available for households to take up, and to differ spatially or by locality. This is because of differences in the resources available (such as natural and physical resources) and the institutions that exist within localities, which would influence the type of income generating activities households engage in. Thus, temporal and spatial dimensions are important in analysing household income diversification patterns. Past studies elsewhere

have considered the spatial and temporal dimensions in household income diversification patterns (Lay et al. 2009; Xu 2017, Djido & Shiferaw 2018; Chuang 2019; Loison 2019) and found that the strategies changed over time and differed by location.

In South Africa, Daniels et al. (2013) analysed rural livelihoods over time, aggregated at the national level. The study utilized the National Income Dynamics Study data to investigate rural livelihoods over the period 2008 to 2012. Mathebula et al. (2016) investigated income diversification using the Income and Expenditure Survey (IES) of 2010/2011 in three rural provinces. The study accounted for differences in income sources by location (provinces) but not temporally. Similarly, Pienaar & Von Fintel (2014) used the General Household Survey (GHS) 2010, which only considers household income-generating activities in one period. More recently, Oduniyi & Tekana (2019) investigated rural livelihoods among maize farmers in Ngaka Modiri Molema District Municipality in North West Province using primary data collected over one period. According to our knowledge, there is no study that focuses on temporal and spatial analysis of income diversification, informed by the most recent panel data in South Africa.

An understanding of temporal and spatial variations of household income diversification is important for guiding the implementation of policies and strategies aimed at reducing poverty and improving the resilience of rural households. Such analyses can reveal whether households are diversifying more, or less (specializing), with time, and into which income activities. This would help prevent implementation of policies and strategies that do not align with household income activities.

The purpose of this paper was to analyse rural household income diversification over the period 2008 to 2017 in four rural provinces of South Africa, using panel data obtained from the National Income Dynamics Study (NIDS). The present study adds to existing literature by providing insights from analyses over a longer period, using the most recent NIDS data and presenting a disaggregated analysis of income diversification trends. The remainder of the paper is as follows; section two reviews the literature on spatial and temporal variations of income diversification, section three outlines the research method; section four reports the results and the conclusions and recommendations are in section five.

2. Literature on spatial and temporal variation of income diversification

The literature indicates that household income diversification as a strategy for survival or to grow income, also differs by location and can change over time. This is because the physical context affects opportunities for diversification (Johny et al. 2017) and, as these opportunities change, the combination of income sources changes. Spatial and temporal variations in income diversification have been evident in different countries as discussed below, including research findings in South Africa.

In rural Burkina Faso, Lay et al. (2009) observed temporal variations in the pattern of income diversification in the years 1993, 1994 and 2003. The study used surveys to analyse shocks, structural changes and patterns of income diversification. The finding was that income diversification patterns changed, with households diversifying less over time due to higher returns from cotton and livestock activities, as well as better opportunities in non-farming activities. The authors noted that, had the analysis been limited to one period after the drought experienced in the country, the conclusion would have been that livelihood patterns of rural households did not change over the period.

Using data covering three decades, Chuang (2019) found spatial variations in household income diversification among farming households in India. The diversification was into non-farming income sources and differed depending on the location of the farm households. In areas that had more historically variable weather, households diversified less into non-farming activities compared to households in areas with historically less variable weather conditions. This was because, over time, households in areas with more variable weather developed coping measures while those in areas with less variable weather had not adapted to the variations and diversified more into non-farming wage jobs. The findings had implications for climate change strategies in India, as the

investigation of household income strategies over time revealed which areas were more vulnerable to climate change risk.

Similarly, in Uganda and Nigeria, Djido & Shiferaw (2018) also observed spatial differences in household income diversification. The authors found that, in Uganda, rural households far from roads and urban markets used the income diversification strategy more compared to households in urban areas. In Nigeria, income diversification was highest among households closer to markets and urban centres. The relatively higher engagement in non-farming activities observed in Nigeria implied that transition from farming to non-farming activities positively and progressively related to income diversification, while the opposite was true in Uganda. The study used panel data from the Living Standards Measurement Study-Integrated Survey on Agriculture (LSMS-ISA) (2010/11 and 2012/13) in Nigeria and (2009/10, 2010/11, 2011/12) in Uganda.

Spatial variations in income diversification have also been evident in rural China. Wan et al. (2016) found that the spatial location of households determined the type and number of income sources as well as the degree of income diversification households engaged in. The study used primary data collected in 2014 from 291 rural households in 13 townships. Households in the Mid plains area had the highest degree of diversification, followed by households in the South mountain area and lastly those in the North hilly area. In the Mid plains, the most common sources of income were crops (spring wheat, naked oat, benne, millet and corn), vegetables, and non-farming wages and state grants. In the North hilly area where the level of diversification was the least, households diversified their income with crop, potato and livestock production, as well as non-farming wage income and state grants. This highlighted the fact that, though the

income sources were more numerous in this area, households were either not receiving income from all sources or the relative contribution or weight of each source to total income was small such that it did not improve their degree of diversification.

In addition to spatial differences in income diversification in China, temporal variations in this strategy also occurred. Using panel data from 1995 to 2015, covering 31 provinces, Xu (2017) found differences in the level of income diversification among provinces, and that this diversification increased over time. Household income diversification was found to increase with the level of income; thus pointing to diversification for growth or accumulation by households. Spatial differences in income diversification also occurred when categorizing households into three main groups of provinces in China based on economic, social and cultural backgrounds. Households in the eastern provinces had the highest level of income diversification, followed by households in the western provinces. The households in the eastern provinces also had the highest average income of all the provinces, while those in the western provinces had the lowest average income. This further pointed to diversification for accumulation and growth among the high-earning households and diversification for income risk reduction among low-earning households.

The spatial and temporal analysis of income diversification in rural Kenya also revealed variations in the efficacy of this strategy between 2008 and 2013 (Loison 2019). In Kakamega district, there was an increase in household income between the two periods, particularly from non-farming activities. Households in this district diversified more over time into non-farming income sources, although this was in low-return income activities. In the district of Nyeri, on the other hand, there was an overall decline in

household income because of the decline in farm income. This pointed to less on-farm income diversification by these households over time.

In South Africa, Daniels et al. (2013) investigated rural livelihoods using data from 2008 to 2012. The study found that, over the four-year period, rural households that were involved in non-employment agricultural activities in 2008 were no longer involved in such activities by 2012. Households were taking up more non-agricultural income sources, including social grants, and thus diversifying out of agriculture over time. When disaggregated by province, using data from the Income and Expenditure Survey (IES) 2010/2011 and the 2010 NIDS data, Mathebula et al. (2016) observed spatial differences in household income diversification among three provinces of South Africa. The degree of income diversification was highest in Limpopo and KwaZulu-Natal provinces. The Eastern Cape Province had the lowest level of income diversification. Although the data differed slightly, what was similar to the findings by Daniels et al. (2013) was the relatively low share of agricultural income to total household income in all three provinces. The highest share of income was from various forms of employment (salaries and wages), followed by social grants (Mathebula et al. 2016).

Although conducted in various countries and contexts, the studies above indicate spatial and temporal variations in income diversification, with more emphasis on spatial differences. These variations have implications for strategies that can to assist rural households. The findings imply that generalized strategies across localities and over time may miss their target.

The current study seeks to build on previous research in rural South Africa that has examined temporal variation in income diversification and across provinces, by

examining changes in income diversification among a panel of households over a longer period and in different provinces. In addition, the method adopted differs from previous methods applied in the South African literature.

3. Materials and methods.

3.1 Data

The paper used panel data of rural households from the National Income Dynamics Study (NIDS). NIDS is a nationally representative panel study conducted approximately every two years and collects individual and household data. The data include income and expenditure of individuals and households. There are currently five waves of NIDS (waves 1-5), conducted in 2008, 2010, 2012, 2014 and 2017, respectively. The data used in this paper on household income, income sources, and the characteristics of the household heads were from NIDS. The income data used in this paper were in real terms and converted using Statistics South Africa (Stats SA) Consumer Price Index (CPI) with December 2016 as the base year.

NIDS data cover the rural (traditional), farm and urban areas of South Africa. Only the rural sample of the dataset were analysed in this paper. The rural households are in the former homeland areas in communally owned land under the jurisdiction of traditional leaders, and the settlements within these areas are villages (Brophy et al. 2018). The areas fall under different provinces and with different economic activities, which include agriculture, mining and services (Statistics South Africa [Stats] 2017a).

The paper used a panel of individuals who were interviewed successfully in all five waves of the survey. The selection of these individuals was limited to those identified as household heads. This resulted in a balanced panel, representing 596 households.

However, the number of household heads from the Free State (FS), Mpumalanga (MP) and Northern Cape (NC) provinces were relatively small and these did not form part of the sample, leaving 517 household heads. These household heads represented households in KwaZulu-Natal (KZN), the Eastern Cape (EC), Limpopo (LP) and North West (NW) provinces.

Table 1 gives a brief profile of these four provinces in terms of their population size, main economic activities, and the unemployment rate in the 4th quarter of 2017, and GDP growth in 2016, as reported by Stats SA.

Table 1: Profile of the four provinces

	KwaZulu-Natal	**Eastern Cape**	**Limpopo**	**North West**
Population (in millions)	11,07	6,49	5,77	3,85
Main economic activity	Manufacturing. Finance, real estate & business services. General government services	General government services. Trade, catering, accommodation	Mining & quarrying. General government services	Mining &quarrying General government services Finance, real estate & business services
Unemployment rate (% at 4th quarter of 2017)	24.1	35.1	19.6	23.9
GDP growth in 2016 (%)	0.7	0.8	-0.6	-3.6

Source: Stats SA, 2017a, Stats SA, 2017c

In 2017, the main economic activities in the Limpopo and North West provinces were mining and quarrying, as well as general government services. Manufacturing and finance, real estate and business services were the main economic activities in KwaZulu-

Natal, while general government services, trade, catering and accommodation were the main activities in the Eastern Cape. The population size in those provinces ranged between three and 11 million, while the unemployment rate ranged from 19 to 35 per cent. The Eastern Cape and KwaZulu-Natal provinces recorded positive GDP growth in 2016, while Limpopo and North West recorded declines in the same year.

The literature on income diversification uses characteristics and attributes of household heads, such as age, gender, marital status and education level, as some of the important factors that influence household income diversity (Senadza 2012; Javed et al. 2015). This literature informed the choice to focus on household heads and their characteristics in this paper.

3.2 Data analysis

To analyse income diversification patterns of rural household in the NIDS sample, the Simpson Index of Diversity (SID) is used. SID is a two-dimensional index, first applied in studies that evaluate species diversity. It has, however, also been applied in the income diversification literature (Agyeman et al. 2014; Sultana et al. 2015; Dagunga et al. 2018). SID measures both the number of income sources as well as the distribution of the income between the different sources (Agyeman et al. 2014; Dagunga et al. 2018). This gives SID an advantage over one-dimensional indices as it accounts for both the number and share of the income sources. This makes SID a reasonable measure of income diversity to use in this study. SID takes into account the uniformity of the distribution of incomes generated (Dagunga et al. 2018). Equation 1 represents the SID formula:

$$SID = 1 - \sum_{i=1}^{s} P_i^2 \qquad\qquad 1$$

- *SID* is the measure of income diversification;

- *S* is the number of income sources; and

- P_i is the proportion of income coming from i^{th} source (activity).

Equation 2 shows how P_i is calculated:

$$P_i = \frac{X_i}{\sum_i X_i}$$
2

Where

- X_i is the income coming from source i; and

- $\sum_i X_i$ Is the sum or total of all the income for the household.

Equation 3 estimates P_{it} as the proportion of income over time:

$$P_{it} = \frac{X_{it}}{\sum_i X_{it}}$$
3

- P_{it} Is the proportion of income coming from i^{th} source (activity) at year t.

The value of SID lies between zero and one. When households have few different income sources, SID is low. SID becomes zero when the household depends on only one income source i.e. when $P = 1$, SID = 0. When the number of income sources increases, the share of P_i declines. The sum of the squared shares also declines and SID gets closer to one. The closer SID is to one, the higher the level of diversification. The closer it is to zero, the higher the level of specialization (Sultana et al. 2015). Although a SID closer to zero measures the degree of specialization, this study focused on diversification and the interpretation of the results are in terms of income diversification.

4. Results and discussion

4.1 Demographic characteristics of rural households

This section reports the demographic characteristics of the household heads in the data in each province. Table 2 presents the demographic characteristics of household heads in terms of gender, age, household size, education and marital status. These demographic characteristics are as at 2008.

Table 2: Demographic characteristics of household heads as at 2008

Variables	Province				All provinces
	KwaZulu-Natal	Eastern Cape	Limpopo	North West	
Gender of household head					
Female (%)	83,69	76,99	85,58	64,18	80,43
Male (%)	16,31	23,01	14,42	35,82	19,57
Average age (Years)	54	54	54	50	54
Average household size (number)	5	4	4	4	4
Education level of household head					
No schooling (%)	40,77	23,01	39,42	13,43	33.27
Primary (%)	40,77	44,25	28,85	34,33	38.36
Secondary (%)	12,45	23,01	17,31	31,34	18.00
Matric	3,00	3,54	9,62	11,94	5.28
Diploma/certificate beyond matric	1,29	2,65	0,96	5,97	2.15
Bachelor's degree	-	0,88	0,96	-	0.39

Marital status of household head					
Married (%)	18,03	24,78	24,04	22,39	21,14
Widow/widower (%)	47,21	44,25	31,73	29,85	41,49
Divorced/separated (%)	1,72	11,50	10,58	7,46	6,26
Living with partner (%)	4,72	0,88	1,92	2,99	3,13
Never married (%)	28,33	18,58	31,73	37,31	27,98

Source: Own compilation from NIDS data

Table 2 indicates that in all four provinces, females headed the majority of households. With the exception of North West Province, females headed over 75 per cent of the households. It is also evident from Table 2 that the average age of the household head was 54 years in three out of the four provinces. The average age of the household head was 50 in North West province. KwaZulu-Natal had on average the highest number of household members compared to the other provinces, although the difference was small.

In KwaZulu-Natal and Limpopo provinces, about 40 per cent of the household heads had no schooling, while in North West and the Eastern Cape provinces, the majority of the household heads had primary education. About six per cent of the household heads in North West Province had a diploma or a certificate, in addition to having completed matric. None of the household heads in the KwaZulu-Natal and North West provinces had a bachelor degree or tertiary qualification, while less than one per cent of the household heads in the Eastern Cape and Limpopo provinces had a bachelor's degree.

The majority of the household heads in the KwaZulu-Natal and Eastern Cape provinces were widows/widowers, while those in North West were mostly never married. The Limpopo province had an equal share of household heads who were widows/widowers and those that were never married. This demographic composition remained similar throughout the waves.

4.2 Sources of income of rural households over the period 2008 to 2017

This section discusses the household income sources by share of households as well as the average number of income sources per household in each province.

4.2.1 Income sources adopted by rural households

The study identified eight sources of income across all waves of NIDS from 2008 to 2017. These were employment (wages), social grants, investment income, capital income, remittances, rental income, income from agricultural activities as well as income from other government sources. The NIDS survey imputes rental income from owner-occupied housing (Brophy et al. 2018). This, however, did not represent actual income received by the owner or the household. Therefore, rental income was not included in this paper. In addition, income from other government sources, made up of the Unemployment Insurance Fund (UIF) and workmen's compensation, represented less than one per cent of household income. These were also not included in the paper. Therefore, the income sources considered in this paper were six as shown in Table 3. Table 3 shows the income sources in terms of the percentage of households in the panel receiving income from each particular source. The main income sources across all five waves were wages, social grants, remittances and income from agricultural activities.

Table 3: The percentage of households adopting each income source by province from 2008 to 2017

Year	Income source	KwaZulu-Natal	Eastern Cape	Limpopo	North West
2008	Wages	40,77	30,09	41,35	65,67
	Social grants	84,12	65,49	75,96	68,66
	Investment	0,00	0,88	0,00	2,99
	Capital	2,58	0,88	0,96	1,49
	Remittance	15,45	15,04	21,15	11,94
	Agriculture	27,47	13,27	32,69	11,94
2010	Wages	26,18	29,20	35,58	47,76
	Social grants	70,8	65,49	76,92	64,18
	Investment	8,15	0,00	0,96	5,97
	Capital	2,58	1,77	1,92	4,48
	Remittance	9,87	9,73	11,54	8,96
	Agriculture	0,86	7,08	0,00	0,00
2012	Wages	39,48	29,20	36,54	52,24
	Social grants	81,55	70,80	77,88	58,21
	Investment	1,29	0,88	0,96	10,45
	Capital	0,00	4,42	1,92	2,99
	Remittance	17,17	16,81	13,46	8,96
	Agriculture	10,30	12,39	8,65	8,96
2014	Wages	42,06	31,86	47,12	53,73
	Social grants	82,83	76,11	76,92	67,16
	Investment	1,72	2,65	2,88	7,46
	Capital	0,43	3,54	0,00	5,97
	Remittance	26,61	20,35	35,58	29,85
	Agriculture	19,31	14,16	22,12	2,99
2017	Wages	37,77	38,05	48,08	53,73
	Social grants	76,39	76,11	81,73	74,63
	Investment	3,43	7,96	7,69	5,97
	Capital	0,86	0,88	0,96	2,99
	Remittance	29,18	26,55	27,88	20,90

Agriculture	20,17	29,20	5,77	8,96

Source: Own compilation from NIDS data

From Table 3, the majority of the panel households received social grants over the period 2008 to 2017. This was over 70 per cent of households in KwaZulu-Natal and Limpopo provinces. In the Eastern Cape Province, over 65 per cent of the panel members received social grants in the period 2008 to 2010. This increased to over 70 per cent in the period 2012 to 2017, while in North West Province this number increased to almost 75 per cent by 2017. This relatively high number of households receiving social grants gives an indication of the wide reach of the social wage policy in these provinces.

Table 3 also indicates that a number of panel households received some form of wages between 2008 and 2017. This number ranged between 26 and 48 per cent in the KwaZulu-Natal, Eastern Cape and Limpopo provinces. The figure was higher in North West, ranging between 47 and 76 per cent.

Previous studies on income diversification in South Africa also identified these two income sources (social grants and wages) as dominant sources of income (Daniels et al. 2013; Mathebula et al. 2016). What is also evident from Table 3 is that a number of panel households also received remittance income. The percentage of panel households receiving this source of income was particularly high between 2014 and 2017. Lastly, Table 3 shows that some of the panel households participated in agricultural activities. The percentage of such households was relatively low and fluctuated over the nine-year period. Machethe et al. (2004) stated that, historically, households in the former homeland areas or rural areas of South Africa relied on agriculture for their livelihoods. However, in recent years, studies (De la Hey & Beinart 2017; Connor & Mtwana 2018) have found that the participation of households in agricultural activities in the former homeland areas has been declining.

From Table 3, although the relative percentages of households engaging in agricultural activities were small, there are some differences among the provinces. KwaZulu-Natal and the Eastern Cape provinces had relatively more households participating in agriculture in four out of the five survey years (2008, 2012, 2014, and 2017). North West, on the other hand, had the least percentage of households participating in agriculture, while Limpopo had relatively high participation only in 2008 and 2014.

The smallest percentage of households received investment and capital incomes over the period 2008 to 2017. No more than 10.5 per cent of households per province in any year received income from these sources. This highlights findings by other studies that there has been a decline in household savings over time in South Africa (Prinsloo 2000; Kasongo & Ocran 2017).

4.2.2 Average number of income sources per household

Having observed the type of income sources rural households received income from, this section gives the average number of sources per household. The number of income sources presented in Figure 1 are from 2008 to 2017 and for each province.
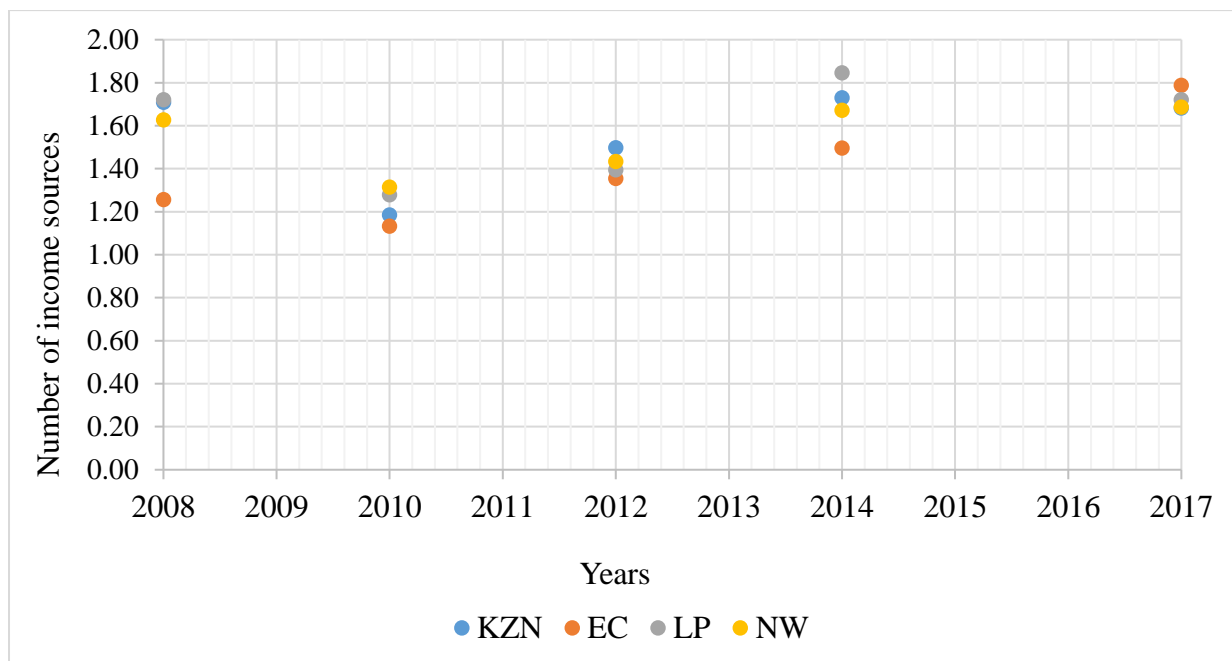
Figure 1: The average number of income sources per household from 2008 to 2017

Source: Own compilation from NIDS data

Figure 1 shows that in 2008, the average number of income sources in KwaZulu-Natal and Limpopo was 1.71. In North West province, the average was 1.63. In the same year, households in the Eastern Cape had an average of 1.26 income sources. These numbers declined in 2010, with panel households in all four provinces not having more than 1.31 income sources on average. In the period 2008 to 2010 there was a global economic crisis, which affected the South Africa economy as well (Organisation for Economic Co-operation and Development [OECD] 2010; Industrial Development Corporation [IDC] 2013) and could have affected household sources of income. The average number of income sources increased between 2012 and 2014, and by 2017, it was between 1.68 and 1.79 in all provinces.

4.3 Rural household monthly income

Section 4.2 indicated the six income sources from which the households in rural areas derived their income. However, not all households derived their income from all six sources, but rather from various combinations of sources. Table 4 shows the average monthly income households generated from those income sources from 2008 to 2017 for each province.

A combination of Oneway ANOVA and Welch tests determined the statistical significance of the income values reported in Table 4. Both tests report results at 5 per cent significance level. Table 4 also shows these results. Wave one and wave two (2008 and 2010) show the results of all the provinces, while wave three to five (2012 to 2017) give the results of North West provinces compared with Limpopo, Eastern Cape and KwaZulu-Natal provinces. The results indicated statistical significance, although with variations. The household income in North West Province was statistically different from the income in the other provinces in all waves. In the Limpopo, Eastern Cape and KwaZulu-Natal provinces, there was no significant difference in income. The fact that most of these rural households earned social grants more than any other form of income could explain the insignificant differences. This implied that the income received by these households from other income sources, such as agricultural activities, wages and remittances, were not making a sufficient contribution to total income earned for significant differences to result among provinces.

Table 4 shows that in all provinces, the average income increased from 2008 to 2017, with the exception of KwaZulu-Natal and North West in 2017. The decline in KwaZulu-Natal resulted from the decline in the number of households that reported receiving

wages, social grants and income from agricultural activities in that year. In North West province, there was a decline in the percentage of households that received remittance income between 2014 and 2017. In addition, the Province experienced negative growth in 2016 (Stats SA 2017a), which could also have contributed to the decline in household income by 2017.

Table 4: Average monthly household income from 2008 to 2017*

Year	Province			
	KwaZulu-Natal	Eastern Cape	Limpopo	North West
2008	2 336.17	2 106.37	2 400.67	3 506.03
2010	2 445.20	2 218.39	2 831.70	3 964.35
2012	3 357.66	3 161.81	2 793.94	4 220.30
2014	3 738.99	3 130.53	3 620.34	6 100.43
2017	3 551.75	3 452.14	3 753.46	5 434.82

Source: Own compilation from NIDS data

*Values in ZAR

Mean difference tests:

2008: Oneway Anova: Prob > F (0.0061)

2010: Oneway Anova: Prob > F (0.0226)

2012: Welch test: Pr (|T| > |t|) = 0.0378

2014: Welch test: Pr (|T| > |t|) = 0.0025

2017: Welch test: Pr (|T| > |t|) =0.0093

Table 4 also indicates that the average household income was highest in North West province, and least in the Eastern Cape Province. This could be because relatively more households in North West Province received wages from various forms of employment. These included wages from formal employment, casual work, self-employment, a 13th cheque, bonus payments, profit shares, income from friends, as well

as any extra piece-rate income. In other provinces, the percentage of households receiving wages was relatively low.

The numbers compared relatively well with Stats SA's national numbers for rural households. The Income and Expenditure Survey (IES) of 2010/11 indicated an average household income of R3 356 per month in that year (Stats SA 2012), while the sample used in the present paper indicated an average that ranged from R2 218 in Limpopo to R3 964 in North West. The average income from the IES reported does not include owner-imputed rent. Similarly, the Living Conditions Survey (LCS) of 2014/15 indicated an average monthly income of R4 881 (Stats SA 2017b), while the present study found an average ranging from R 3 130 in the Eastern Cape to R3 738 in KwaZulu-Natal. The average in North West was slightly higher at R6 100. This again could be because relatively more household in North West received wages from various forms of employment, while in other provinces social grants were the most common income source.

4.4 Degree of income diversification

The previous sections identified the type of sources from which the panel of households derived their income over the period 2008 to 2017, as well as the average monthly income generated by those sources. This section uses the Simpson Index of Diversity (SID) to determine how diversified the income sources of the households were. The estimated SID is from 2008 to 2017. SID ranges between zero and one. The level of income diversification increases the closer SID is to one. Figure 2 presents the SID results for each province from 2008 to 2017 as well as the Total SID for all the provinces. It also indicates the trend of the SID for each province over time.
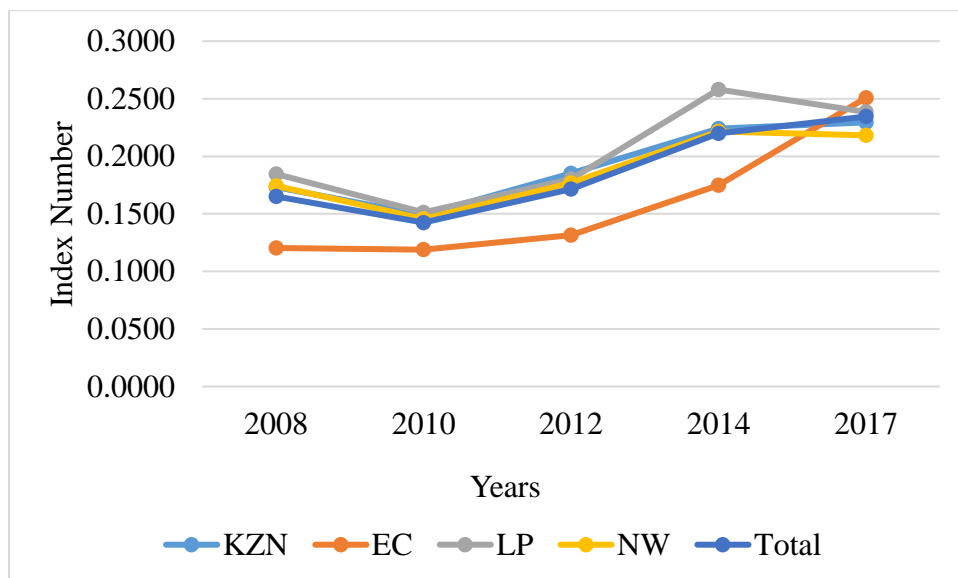
Figure 2: Average provincial SID from 2008 to 2017

Source: Own compilation from NIDS data

Figure 2 indicates that SID in 2010 was generally lowest in all the provinces. The decline in SID from 2008 to 2010 resulted from the drop in the number of income sources observed in 2010, as mentioned in the previous section. SID increased from 2010 to 2017 in KwaZulu-Natal and Eastern Cape provinces, indicating that the panel of households in those provinces consistently increased their income sources and level of diversification over that period. Relative to the Total SID, SID of households in KwaZulu-Natal remained on par, while those in the Eastern Cape Province were below average, except in 2017. For the Eastern Cape Province, the increase observed between 2014 and 2017 reflected the improvement in the percentage of households that received wage income. Stats SA Quarterly Labour Force Survey (QLFS) reported the Eastern Cape to be among the provinces that experienced the biggest gain in employment between 2015 and 2016 (Stats SA 2016).

In Limpopo Province, SID increased from 2010 to 2014 and then declined in 2017. There was a similar trend in North West Province. However, the decline was relatively small in North West compared to Limpopo. According to Limpopo treasury, the Limpopo Province experienced a sharp decline in growth across all its districts between 2015 and 2016, (Limpopo Treasury 2018). At the same time, the Province also recorded an improvement in employment between 2015 and 2016 (Stats SA 2016). This paper also observed this improvement, with an increase in the percentage of panel households that received wage income between 2014 and 2017. However, this observed increase was relatively small. The number of income sources among households in that province declined and SID also declined by 2017. Relative to the Total SID average, SID of households in Limpopo and North West provinces were high with the exception of the period 2014 to 2017 in North West.

Figure 2 also indicates that the average SID in Limpopo was higher in each year compared to North West. This was the case even though North West had the highest household income throughout the period. There is a similar observation between North West and KwaZulu-Natal, with the exception of SID in 2008. Thus, the higher average household income in North West did not translate to the highest degree of diversification. Similarly, the Eastern Cape had the lowest average household income throughout the period and the lowest degree of diversification, except in 2017 when the province had the highest SID. Mathebula et al. (2016) also found the Eastern Cape to have the lowest degree of diversification among three provinces in 2010. These findings differ from some other studies, where the level of diversification was found to be highest in areas with the highest income and/or in areas with the least income (Xu, 2017; Djido

& Shiferaw, 2018; Loison, 2019). In this study, this was only in 2017 when the Eastern Cape, which had the least income, also had the highest degree of diversification.

What Figure 2 also indicates is that, the trend in SID in all the provinces was upward. Thus, by 2017, households were diversifying more than in 2008. This reflected the increase in the number of income sources, and the total income, observed from 2008 to 2017. Although increasing over time, the degree of diversification in all provinces and over the entire period was relatively low and no greater than 0, 25. Therefore, even though some degree of diversification occurs, the relatively low SID indicated that, generally, these households relied on few income sources. Indeed, this was the case when, out of the six income sources identified, the households concentrated on only four sources. Even among these four sources, the highest percentage was on social grants while relatively few households received wages, remittance and income from agricultural activities.

5. Conclusion and recommendations

The findings of the study point to the importance of temporal and spatial disaggregation when analysing household income diversification. The degree of income diversification in each province differed from the aggregated total. Limpopo, KwaZulu-Natal and North West provinces had relatively higher SIDs than the aggregated total, while the Eastern Cape had a relatively lower degree of income diversification. In addition, the findings indicate that, although North West had the highest average income overall, it did not have the highest degree of income diversification. Similarly, the Eastern Cape had the lowest average income and the lowest level of diversification, except in 2017.

The findings also indicated that households were diversifying more with time in each province, with SID increasing on average from 0.16 in 2008 to 0.23 in 2017. The guiding principle with SID is that, the closer it is to one, the higher the degree of diversification. Thus, an index ranging between 0.16 and 0.23 is still relatively low, indicating a high reliance on a few income sources by the households. The spatial and temporal differences in household income diversification observed in this study suggest that policy strategies should take into account differences that exist within provinces.

The study recommends support to rural households to diversify their income. This is because income diversification can have positive impact on poor households, as it increases their ability to withstand shocks (Wan et al. 2016). Specifically, the findings indicated that agricultural activities were among the top four income sources from which households generated income. Households in the KwaZulu-Natal, Eastern Cape and Limpopo provinces showed greater participation in agriculture over the nine-year period, although not higher than 35 per cent at any point in time. Therefore, support is required for more households to take up agriculture in those provinces. The provincial government in those provinces could channel strategies towards assisting more households to take up agriculture in order to improve their income and diversification. This would be in line with the National Development Plan (NDP), which has identified agriculture as an important sector to grow the rural economy.

In North West Province, more households earned wage income from various forms of employment, including casual work and self-employment. Therefore, efforts to assist these rural households in business ventures through the provision of support in skills development and training would go a long way to improving household incomes. Rural

households in KwaZulu-Natal and the Eastern Cape can also receive such support where business services and trade, catering and accommodation are among the top economic activities in the provinces.

Over five per cent of households earned investment and capital income in North West. The province could explore and promote opportunities for other households to also engage in these activities.

The paper did not investigate the factors that influenced the pattern of income diversification observed among these households. This is important for strategies seeking to support rural households. The study recommends further investigation in this regard.

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