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Postponement of parenthood in South Africa: Gendered differences in attitudes towards children by socio-cultural characteristics

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Abstract

Evidence suggest that South Africans are postponing childbearing and parenthood. The country has a much lower total fertility rate (TFR) than neighbouring countries and this is attributed to a high age at first birth, contraceptive use and cultural practices. The purpose of this study is to better understand the postponement of parenthood through an examination of the gendered differences in attitudes towards children by socio-cultural characteristics. The study uses the South African Social Attitudes Survey (SASAS) of 2012 which included a section of questions on families and children. The study population is restricted to 266 men and women aged 30 to 40 years who do not have any children. Five questions on attitudes towards children are included and an index variable is created to measure overall attitudes. Cross-tabulations and a multivariate logistic regression model are used. More males (66.61%) than females (33.39%) at the bivariate level have negative attitudes towards children. Even by race, ethnicity, highest level of education, place of residence, and employment, there are further gendered differences, predominantly showing that males have more negative attitudes than females. However, the multivariate models show that females have higher odds of negative attitudes when all control variables are included. The gendered differences seen in this study could contribute to the postponement of parenthood, especially since females are less likely to have positive attitudes when all socio-cultural and socio-economic levels are included. Therefore, the resulting low fertility has social and economic consequences for which the country's policymakers should prepare.

Keywords: *postponement, attitudes, childbearing and parenthood, socio-cultural differences, South African Social Attitudes Survey*

1. Introduction

South Africa has been undergoing a fertility transition from as early as the 1950s. The decline in the rates of fertility in the country are well-documented although data sources used to derive estimates were defective and often fragmented (Caldwell and Caldwell, 1993; Caldwell and Caldwell, 2003; Chimere-Dan, 1999; Moultrie and Timæus, 2003; NDoH, 2000; Sibanda and Zuberi, 1999; Udjo, 1997). South Africa's population policies under the government are one possible explanation for the fertility decline starting in the country. Out of fear for the growing Black African population, the apartheid government started a comprehensive campaign for family planning and contraceptive services in the 1960s (Swartz, 2009). This was a seemingly successful endeavour, and by the end of the 1960s about 61.2% of females of reproductive age, including approximately half of the married Black African females, were reportedly using at least one type of contraception (Swartz, 2009). Post-apartheid, the legalisation of termination of pregnancy in 1996 along with the ongoing family planning and contraceptive services, have also assisted to some extent in keeping fertility levels near replacement level (Hlongwa et al., 2020; Swartz, 2009).

Various studies point to South Africa as leading the fertility transition in sub-Saharan Africa, declining from an average total fertility rate (TFR) of 6-7 children per woman in the 1950s-60s, to 4.5 children per woman in the 1980s, to 3.3 children per woman in the 1990s, and 2.33 children per woman currently (Chimere-Dan, 1993; Moultrie and Timæus, 2003; Palamuleni et al., 2007; Sibanda and Zuberi, 1999; Statistics South Africa, 2020a). Few other countries on the continent

have achieved replacement level fertility rates, with the exception of Cabo Verde, Mauritius and the Seychelles; however, none of these countries are as large in geographic and population size as South Africa (Garenne, 2018). More commonly, other sub-Saharan countries such as Niger, Somalia and the Democratic Republic of the Congo have been unable to reduce their TFR to below 5 children per woman (World Population Review, 2020).

South Africa's current TFR of 2.33 children per woman is not uniform across all population groups, with the TFR of White females at 1.70 compared to 2.82 for Black African females (Statistics South Africa, 2020a). There are further differences by education status, which show that females with no education (TFR of 2.8 children per woman) have more children than those with more than a secondary education (TFR of 2.2 children per woman) (NDoH, SAMRC & ICF, 2019). These marginal differences in TFRs by population group and education suggest that there is more to the fertility decline in the country. In addition to the low TFR, South Africa's median age at first birth has remained consistently high at 27.4 years in 1998 and 27 years in 2015 (Statistics South Africa, 2020b). For the region of sub-Saharan Africa, this is high, since the median age at first birth in Chad is 17.9 years and in Malawi it is 18.9 years (Carlson et al., 2011; Grant, 2015).

Both the country's decline in TFR and the high age at first birth have been attributed to the abolishment of overall segregation laws, which prevented many Black African females from accessing education, employment, and healthcare services, as well as the current government's efforts to promote employment and education of previously disadvantaged racial groups (Barbarin and Richter, 2013).

In addition, other key aspects contributing to low fertility in the country include the weak presence of cultural practices such as child marriage in the country which has allowed females to remain childless for longer (Coovadia et al., 2009). Also, relatively strong acceptance and uptake of contraception, at 19% of sexually active adult females using an oral pill and 51% using an injectable contraceptive, have also contributed to low TFR and higher age at first birth (Chola et al., 2015). Additionally, cohabitation in the country is common with as many as 12.3% of males and 11.7% of females cohabiting (Statistics South Africa, 2018). Among other reasons for low fertility are the high cost of bride wealth or '*lobola*' which has contributed to couples remaining unmarried (Yarbrough, 2018). Collectively, this evidence suggests that South African females are able to postpone first birth.

However, this literature cannot fully explain the sustained low fertility rates more than 20 years after the end of apartheid and in an era of such vast inequality. At present, South Africa is grappling with widespread socio-economic disparities that are contributing to poor health, education and employment outcomes for young females (and males) in the country (Hundenborn et al., 2018). Another result of social inequality is growing differences by different socio-economic groups. An example of this is recent research which shows that Black African females have higher unemployment rates than Black African males at 29.5% and 25.3%, respectively (Statistics South Africa, 2019b). In fact, research has found many gendered differences by different socio-economic and socio-cultural groups and health outcomes, including HIV/AIDS, income differentials, and relationship power dynamics resulting in violence against women amongst others (Mabaso et al., 2017; Rogan and Alfers, 2019; Statistics South Africa,

2019a). Therefore, with gender differences being apparent in various other outcomes, it stands to reason that gendered differences by socio-cultural, sub-populations could also explain the sustained low fertility in South Africa.

The purpose of this study is to determine attitudes towards children and parenthood among 30-40 year olds in South Africa, who have not yet had a first child. The study also aims to determine the gendered differences in attitudes by various socio-cultural characteristics of the respondents.

2. Methods

2.1. Data

Data use for this cross-sectional study is from the 10th round of the South African Social Attitudes Survey (SASAS), which was conducted in late 2012 by the Human Sciences Research Council (HSRC). While this survey is slightly dated, it is used because this round of SASAS included a dedicated questionnaire on family structure, family-related roles and values, which did not appear in previous or subsequent rounds of the survey. The survey was administered to a nationally representative sample of 2,547 respondents, aged 16 years and older, living in private households (HSRC, 2012).

Using STATA version 14, the unweighted sample (n) for the study was 266 (28% of all in the age-range) 30-40 year-olds who had not yet had a first child. The survey constructed a weight variable (HSRC, 2012) which is used in the study. The weighted sample is N=1,330,580. The

reason for the age range used in this study, is because it is slightly above the mean age at first birth (27 years) and is therefore suggestive of a population who were postponing parenthood. This was the sample of predefined adults who answered all of the questions on attitudes towards children (84% of all 30-40-year olds without children in the study). However, in some cases, there was no information on their characteristics, but they have been retained in the study. Of this sample, 57.58% (n=153; N=949,696) were male and 42.42% (n=113; N=380,884) were female. All races, ethnicities and all geographical locations of residence were included in the study.

2.2. Study variables

The outcome in this study was attitudes towards children and parenthood. In particular, negative attitudes as contributors to postponement of parenthood were investigated. The survey questions used were: (i) having children interferes too much with the freedom of parents; (ii) children are a financial burden on parents; (iii) having children restricts the employment and career chances of one or both parents; (iv) having children increases people's social standing in society; (v) adult children are an important source of help for elderly parents. Respondents were asked to answer from either strongly agree to strongly disagree on a five-point Likert scale. For this study, responses have been dichotomised into positive and negative attitudes so as to not over complicate attitudes and perceptions. Principal Component Analysis (PCA) was used to create an index variable, based on the correlations of the aforementioned questions, to determine overall negative (1) and positive (0) attitudes towards children.

Control variables in the study included race (Black African, Coloured, White, Other), ethnicity, highest level of education (primary, some secondary, completed secondary, tertiary), employment status (full-time, part-time, unemployed), type of place of residence (urban-formal, urban-informal, traditional authority areas, rural-formal), and marital status (never married, engaged, divorced/separated). The sex indicator (male or female) of the respondent was also used as an independent, control and stratifying variable to understand differences by socio-cultural indicators of race and ethnicity. These are socio-cultural indicators because both are subjective, self-identified measures that are linked to cultural beliefs and systems (Shchetkina, 2019). Ethnicity has five categories: Sotho, Nguni (Zulu, Xhosa, Ndebele), Afrikaans, English, and Other. These were created through grouping languages of the respondents together by region and culture. Two measures of attitudes towards marriage were added as control variables. These were: (i) marriage is an old-fashioned, outdated tradition and (ii) to what extent do you approve or disapprove of the payment of '*lobola*' (dowry or bride price) as part of marriage. Response categories were, again, on a Likert scale and simplified to dichotomous outcomes.

2.3. Analysis

Descriptive cross-tabulations were used to describe the respondents' characteristics and evaluate gendered differences in attitudes towards children by socio-cultural identity. Weighted results are displayed. A multivariate logistic regression model was used to show the likelihood of negative attitudes towards children by respondent characteristics, controlling for other factors.

3. Results

Table 1 shows percentage distributions of positive and negative responses by sex of the respondent. That is, the sex distribution among those with negative attitudes versus the distribution of those with positive attitudes. Of the 35-40 year olds with negative attitudes towards children, 76.04% were males and 23.96% were females. Among primary educated respondents with negative attitudes towards children, 80.19% were male. Among those with some secondary education, 79.10% were male. Among those with completed secondary 52.46% were male, and among those with tertiary education 68.71% were male. By employment status, 51.76% of unemployed respondents with negative attitudes towards children were female (48.24% male). In traditional authority areas, 95.97% of respondents with positive attitudes towards children were males and 4.03% were female. In rural formal areas, no females reported negative attitudes. By marital status, over 66.58% of never married respondents with negative attitudes towards children were male. Additionally, 66.72% of engaged/married respondents with negative attitudes towards children were male. Among respondents who believe that marriage is outdated and have negative attitudes towards children, 79.12% were male. Finally, among respondents who approve of *lobola* and have negative attitudes towards children, 41.07% were female.

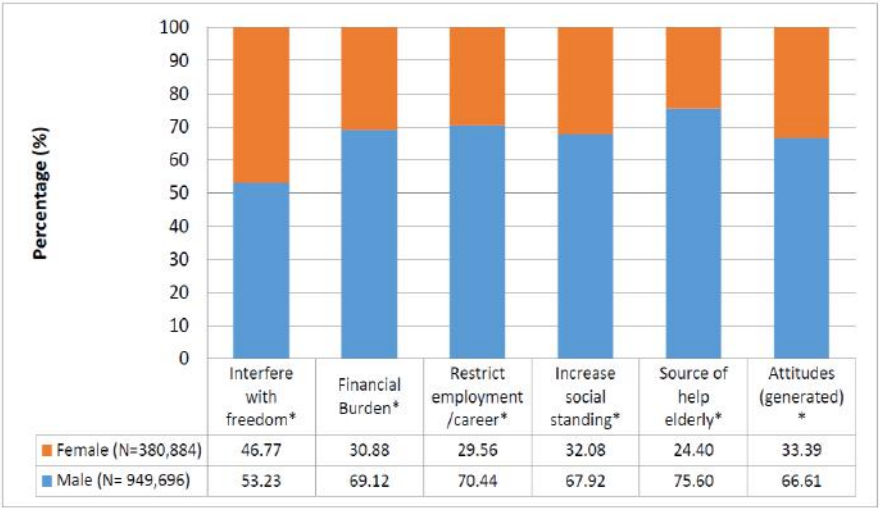
Table 1: Frequency and percentage distribution of respondent characteristics by negative and positive attitudes towards children segregated by sex

Respondent Characteristics		Negative			Positive	
Age Groups	**Total**	**Male***	**Female***	**Total**	**Male***	**Female***
30-34	274,944	51.57	48.43	263,318	72.46	27.54
35-40	438,598	76.04	23.96	353,720	80.18	19.82
Highest level of education						
Primary	147,271	80.19	19.81	21,278	81.73	18.27
Some secondary	156,729	79.10	20.90	212,955	81.77	18.23
Completed secondary	293,929	52.46	47.54	234,175	86.04	13.96
Tertiary education	100,037	68.71	31.29	148,629	54.78	45.22
Employment Status						
Full-time	335,980	66.76	33.24	369,170	70.03	29.97
Part-time	144,381	85.34	14.66	27,440	85.83	14.17
Unemployed	195,202	48.24	51.76	196,684	85.71	14.29
Type of place of residence						
Urban,formal	312,105	63.69	36.31	240,575	63.94	36.06
Urban,informal	125,365	59.70	40.30	52,136	100.00	NR
Trad. Auth. areas	175,205	57.53	42.47	190,667	95.97	4.03
Rural,formal	100,868	100.00	NR	133,659	63.95	36.05
Marital Status						
Never married	571,454	66.58	33.42	399,392	76.50	23.50
Engaged	142,089	66.72	33.28	198,459	78.71	21.29
Divorced/Separated	NR	NR	100.00	19,187	65.96	34.04
Marriage is outdated						
Agree	146,643	79.12	20.88	62,540	100.00	NR
Neutral	68,434	86.01	13.99	11,974	100.00	NR
Disagree	498,465	60.26	39.74	542,523	73.71	26.29
Payment of *lobola*						
Approve	454,887	58.93	41.07	476,375	74.21	25.79
Neither	60,001	78.14	21.86	56,733	82.73	17.27
Disapprove	198,655	80.70	19.30	73,313	86.39	13.61

**p-value <0.05; NR=No Responses*

More males than females have negative attitudes towards children (Figure 1). For those who believe that children interfere with freedom, 53.23% were males and 46.77% were female. Similarly, for those who believe children are a financial burden and that they restrict employment or career options, 69.12% and 70.44% were male, respectively. Among those who believe that children increase social standing, 67.92% were male and 32.08% were female. Further, 75.60% of those who believe that children are a source of help for the elderly are male. Overall, 66.61% of males had negative attitudes, which was estimated from the PCA generated variable.

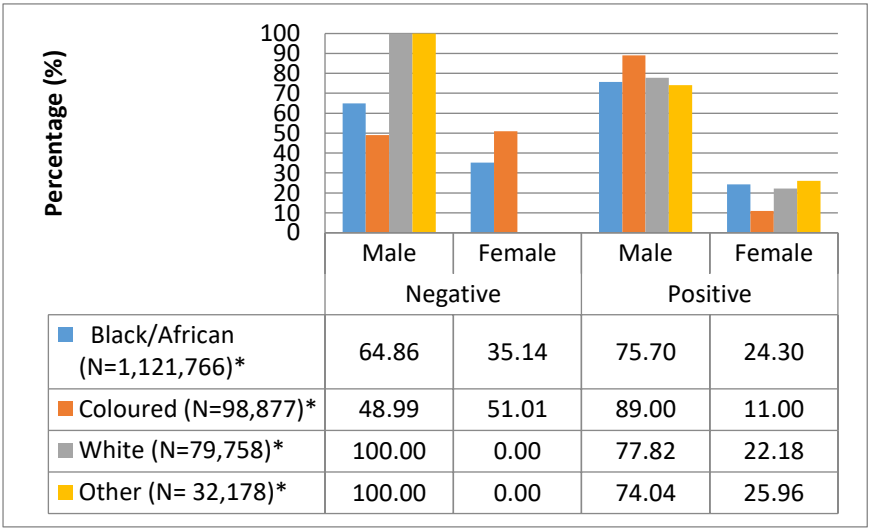
Figure 1: Percentage distribution of specific negative attitudes towards children by sex of the respondents



**p-value<0.05*

Figure 2 shows that among Black African respondents with negative attitudes towards children, 64.86% were males compared to 35.14% females. Among Coloured respondents with negative attitudes toward children, 51.01% were females compared to 48.99% of males. Among White and Other race respondents with negative attitudes towards children all were males. Additionally, 75.70% Black African respondents with positive attitudes towards children were male (24.30% were female), 89 % of Coloured respondents with positive attitudes were male (11% female), 77.82% of White respondents with positive attitudes were male (22.18% female), and 74.04% of Other respondents with positive attitudes were male (25.96% female).

Figure 2: Percentage distribution of attitudes towards children by population group and sex of the respondents

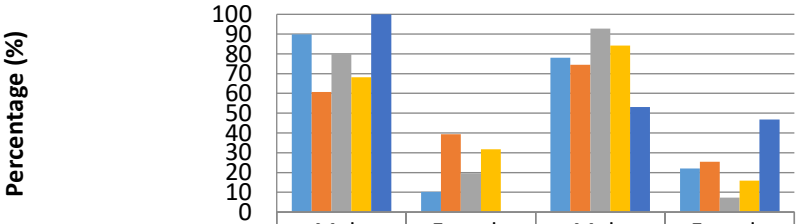


	Negative		Positive	
	Male	Female	Male	Female
Black/African (N=1,121,766)*	64.86	35.14	75.70	24.30
Coloured (N=98,877)*	48.99	51.01	89.00	11.00
White (N=79,758)*	100.00	0.00	77.82	22.18
Other (N= 32,178)*	100.00	0.00	74.04	25.96

**p-value<0.05*

Among English-speaking respondents, 89.83% of negative responses were from males and only 10.17% from females (Figure 3). Similarly, for Nguni-speaking (60.69%), Sotho-speaking (80.37%), Afrikaans-speaking (68.23%) and Other (100%), more males than females had negative attitudes towards children. Among Sotho-speaking respondents with positive attitudes towards children, only 7.28% were females compared to 92.72% males. Among Afrikaans-speaking respondents with positive attitudes towards children, only 15.81% of were female, compared to 84.19% male. Among English-speaking respondents with positive attitudes, 78.03% were male. Finally, among Nguni-speaking respondents, 74.54% were male.

Figure 3: Percentage distribution of attitudes towards children by ethnicity and sex of the respondents



	Male	Female	Male	Female
	Negative		Positive	
English (N=102,037)*	89.83	10.17	78.03	21.97
Nguni (N=914,056)*	60.69	39.31	74.54	25.46
Sotho (N=181,264)*	80.37	19.63	92.72	7.28
Afrikaans (N=106,538)*	68.23	31.77	84.19	15.81
Other (N=26,685)*	100.00	0.00	53.14	46.86

**p-value<0.05*

Table 2 shows the results of the multivariate regression model showing the odds (OR) of negative attitudes towards children by respondents' characteristics. Compared to males in the sample, females have higher odds (OR: 1.67, CI: 1.654814-1.680483) of negative attitudes towards children when all variables in the model are combined which is contrary to the bivariate cross-tabulation results above. This is because once all demographic, socio-economic and socio-cultural characteristics are included and a more holistic model of the population are accounted for, the moderating effect of these characteristics of the female population produces higher odds that they will have negative attitudes towards children and parenthood. Similarly, older respondents, aged 35-40 years (OR: 1.19, CI: 1.179313-1.195799), are more likely to have negative attitudes compared to those that are younger, 30-34 years. By race and ethnicity, Coloured (OR: 0.59, CI: 0.5861729- 0.601952), Nguni (OR: 0.55, CI: 0.5487763-0.560615), Sotho (OR: 0.30, CI: 0.2907804- 0.306637) and Afrikaans (OR: 0.50, CI: 0.4966705- 0.512344) respondents are all less likely to have negative attitudes towards children compared to English-speaking respondents. Respondents with any education higher than a primary are also less likely to have negative attitudes towards children. Part-time (OR: 5.78, CI: 5.702721- 5.861457) and unemployed (OR: 1.09, CI: 1.08202- 1.099061) respondents are more likely to have negative attitudes compared to full-time employees. Residents in both types of rural areas (traditional authority areas and rural informal areas) are less likely to have negative attitudes compared to urban-dwelling residents. Respondents who are engaged or married (OR: 0.50, CI: 0.4964409- 0.504368) are less likely than never married respondents to have negative attitudes towards children. Finally, respondents who indicated that marriage is not outdated (OR: 0.39, CI: 0.3879017- 0.395833) have more positive attitudes towards children, but those who disapprove of *lobola* have higher odds of negative attitudes towards children.

Table 2: Multivariate logistic regression, showing the odds of negative attitudes towards children by respondents' characteristics

Respondent Characteristics	Odds Ratio	Confidence Interval
Sex (RC: Male)		
Female	1.67*	1.654814- 1.680483
Age Groups (RC: 30-34)		
35-40	1.19*	1.179313- 1.195799
Race (RC: Black African)		
Coloured	0.59*	0.5861729 - 0.601952
White	0.99	0.9726186 - 1.001103
Other	NR	
Ethnicity(RC: English)		
Nguni	0.55*	0.5487763 - 0.560615
Sotho	0.30*	0.2907804 - 0.306637
Afrikaans	0.50*	0.4966705 - 0.512344
Other	0.24*	0.2332037 - 0.240946
Highest level of education (RC: Primary)		
Some secondary	0.11*	0.1046712 - 0.108028
Completed secondary	0.18*	0.1785874 - 0.184161
Tertiary education	0.10*	0.0956604 - 0.098862
Employment (RC: Full-time)		
Part-time	5.78*	5.702721 - 5.861457
Unemployed	1.09*	1.08202 - 1.099061
Type of place of residence (RC: Urban, formal)		
Urban, informal	1.85*	1.832245 - 1.874932
Traditional Authority areas	0.71*	0.7023915 - 0.714273
Rural, formal	0.58*	0.576061 - 0.587407
Marital Status (RC: Never married)		
Engaged	0.50*	0.4964409 - 0.504368
Divorced/Separated	NR	
Marriage is outdated (RC: Agree)		
Neutral	2.44*	2.385438 - 2.490518
Disagree	0.39*	0.3879017 - 0.395833
Payment of *lobola* (RC: Approve)		
Neither	1.11*	1.094155 - 1.121126
Disapprove	2.84*	2.811159 - 2.864474

*RC=Reference Category (odds ratio=1.00 or even odds); NR=dropped from model due to too few responses; *p<0.05, **p<0.01, ***p<0.001*

4. Discussion

The study examined gendered differences in socio-cultural characteristics as a determinant of attitudes towards children among childless 30-40 year olds in South Africa. The reason for the study is because South Africa's low fertility rates and high mean age at first birth is fairly unique for the region of sub-Saharan Africa (Hlongwa et al., 2020; Swartz, 2009). This strongly suggests that adults are postponing parenthood but the reasons for this are varied. There are many known factors contributing to this including policy, female education and a broad adoption of contraception and family planning in the country.

Gendered differences in attitudes towards children exist and these perceptions vary between and within socio-cultural characteristics. This is an important finding as it indicates that differentials in race and ethnicity reveal that far more males have negative attitudes towards having children compared to females at the bivariate level. However, when controlling for socio-economic and socio-cultural differences, females are more likely to have negative attitudes than males. This evidence suggests that the effect of socio-economic characteristics (place of residence, employment and education) makes females less in favour of parenthood than males. Perceptions and attitudes towards childbearing in South Africa remain rooted in African culture and for males having children and providing financially for them is an expression of manhood and climbing the social ladder, however, daily care of children remain largely the responsibility of the mother (Beyeza-Kashesya et al., 2010). Another study by Mosley et al. (2020) using the SASAS data from 2008 found that 33% of South Africans still

feel ‘a man’s job is to earn money, while a woman’s job is to look after the home and family’. Similarly, the researchers found that 36% of South Africans believe ‘a job is alright, but what most women really want is a home and children’ (Mosley et al., 2020). This could explain some of the positive attitudes of males and the corroborating negative attitudes of females. In addition, traditional practices, including ‘*damages*’ which is a payment to an unmarried female’s family for a non-marital pregnancy, is a financial cost to young, unmarried males (Makusha and Richter, 2016). Along with other financial costs of living (housing, food, transport, childcare and schooling), ‘*damages*’ could be a reason for the negative financial-related childrearing attitudes among males in the country (Kaufman et al., 2001). Similarly, ‘*lobola*’ which is payment of bride wealth is a financial hindrance to marriage (Yarbrough, 2018) and it is possible that males who cannot afford to pay this sum are equally sensitive to the financial costs of raising children.

In addition to socio-cultural factors, education and employment status are associated with negative attitudes towards children. Respondents with education, from primary to tertiary level, are less likely to have negative attitudes towards children and respondents who were part-time and unemployed were more likely to have negative attitudes. This could be due to the financial cost of child-rearing which many individuals of low socio-economic status simply cannot afford. A study done in Sweden found that competing priorities, between financial security and starting a family is a reason why young individuals postpone parenthood (Eriksson et al., 2013). Among males in Australia it was found that financial security and personal maturity were essential goals before commencing with parenthood (Thompson and

Lee, 2011). Similarly, among females in Germany, economic uncertainties, in particular job security, was a prominent reason for delaying childbirth (Kreyenfeld, 2010). Research on postponement and voluntary childlessness within marriage also found financial motivations as the reason for choosing not to have children while in a union (Baudin et al., 2019; Carroll, 2018). A qualitative study of young females in KwaZulu-Natal, South Africa, found that more educated females choose to marry at an older age so as to establish themselves financially, gain independence, and build their careers (Maharaj and Shangase, 2020). In other African countries, the effect of education on declining fertility is also seen. A recent study found that in Ethiopia and Rwanda, primary education of females is associated with lower fertility rates, while in Zimbabwe, secondary education has an effect on lower fertility (Ndagurwa and Chemhaka, 2020).

There is a relationship between attitudes towards marriage and children. Results from this study show that respondents with negative attitudes towards marriage are also more likely to have negative attitudes towards children. While this might not be surprising in the traditional sense that marriage is a motivation or prior event to childbearing, in the South African context it is interesting because childbearing is known to precede and sometimes replace marriage (Rudwick and Posel, 2013). Cohabitation in the country is fairly common with 11.2% of adults in cohabiting relationships (South African Department of Health, 2017). Research in South Africa has shown that 45.8% of females in rural areas had a premarital first birth and nationally an estimated 21.8% of married couples (30-40 year olds) are childless (Masebe and Ramosebudi, 2016; Sennott et al., 2016). The overall evidence therefore suggests that marriage might

not be a motivation to begin childbearing. This hypothesis has also been suggested in a study done in Italy which found among married and cohabiting females less religiosity and coming from smaller families as the motivation behind voluntary childlessness, even though they wanted partners and to remain married (Tanturri and Mencarini, 2008).

This study is subject to a few limitations. First, the study does not measure actual fertility desire among respondents. That is, there is no measure of when and if respondents intend to have children and since research is moot on the relationship between knowledge, attitudes and behaviour, it is uncertain if these respondents will have children regardless of their attitudes (Conner, 2015; McEachan et al., 2011; Sniehotta et al., 2014). Secondly, the data are from 2012 which is approximately 8 years ago. However, since changes in attitudes do not happen rapidly, the data is likely to still reflect the attitudes of contemporary South African adults. Finally, the study does not identify if gendered differences are the cause of negative attitudes towards children, because the data are cross-sectional.

There are also several strengths to this study. Firstly, the nationally representative sample is large enough to gain statistically reliable results. Secondly, the addition of attitudes towards children and marriage on a national survey is unique and useful to gain insight into the current formation of family structures and dynamics in South Africa. Finally, the study identifies gendered differences not only between but within socio-cultural sub-groups. This is important because it rules out the assumption of homogeneity within race and

ethnicity with regard to attitudes towards children and the implied postponement of parenthood.

5. Conclusion

In conclusion, the differences found here suggest that adults are adapting to social and economic conditions that are shaping their attitudes towards parenthood along gendered lines. As the gap in equality within sub-groups widen, so too will the consensus around parenthood. While South Africa is not below replacement fertility yet, these gendered differences in combination with overall inequality in health and socio-economic status could result in the country experiencing even further fertility decline which could have development consequences for South Africa. The consequences could include a reduced labour force and result in economic challenges. For this reason, policy makers should start planning for immediate and long-term solutions including liberal labour immigration policies and possible socio-economic fertility incentives, such as extended paid maternity leave, in the future. In order, to gain a better understanding of the drivers of postponement of parenthood, a qualitative study, which examines the reasons why South Africans remain childless and addresses micro and macro level determinants would be useful.

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Fertility timing preferences among women of reproductive age: The case of Malawi and South Africa

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Abstract

Even though global fertility levels are falling, the sub-Saharan African region is a relatively high fertility zone. This study examined and compared women's preferred fertility timing in two contrasting contexts – Malawi and South Africa, using the most recent nationally representative data from the Demographic and Health Survey. A multinomial logistic regression was employed to understand the factors responsible for differentials in women's fertility timing preference in both countries. Relationship status, parity and age at sexual debut are common predictors of fertility timing in both countries. While contraceptive use was protective against early desired fertility timing for South Africans, increased education and urban residence emerged as important predictors for Malawian women. Women in both countries have considerable differences in their desired fertility timing. There is a need for improved and targeted family planning services and programmes to increase contraceptive uptake in these countries.

Keywords: *fertility preferences, fertility intentions, Malawi, South Africa, survey*

1. Introduction

Fertility is an important component in population dynamics as it affects size and structure. It is also useful for estimating the rate of unwanted fertility, unmet contraception needs, as well as evaluating the effectiveness of family planning programmes (Khan et al., 2016; Kodzi et al., 2010). Beyond this, understanding women's fertility aspirations are useful for designing a more nuanced population policy and intervention. This is because fertility preferences – that is ideal family size, preferred child-sex or desired fertility timing – reflects personal ideals or goals, if fostered or frustrated, can indirectly affect total fertility (Rabbi, 2014).

Within the known distal fertility factors, some dimensions are better predictors of future fertility behaviour than others. Thus, fertility timing preferences – defined as the desired timing and/or spacing of pregnancies or births – can be a better predictor of actual family size than the desired number of children (Abbas et al., 2013). It is a biological fact that women who begin childbearing earlier and/or have shorter birth intervals are more likely to have more children over their reproductive life span (Batyra, 2016).

Yet, despite its predictive value, fertility timing preference is an inadequately explored dimension of childbearing aspirations in sub-Saharan Africa. The empirical literature on child-timing desires in the region is scanty, perhaps because of a relative lack of longitudinal data availability in the region (Hayford and Agadjanian, 2012). Available empirical studies that closely allude to the issue are predominantly focused on changes in fertility preferences (Kodzi et al., 2010; Sennott

and Yeatman, 2012; Trinitapoli and Yeatman, 2018) or birth-spacing practices (Oyefabi et al., 2019; RamaRao et al., 2006).

It is against this backdrop of the paucity of fertility aspiration studies in sub-Saharan Africa that this research seeks to understand what aspects of women's individual and social characteristics are associated with acceleration or delays in their desired timing of childbearing. Specifically, the present study aims to describe and compare the preferred timing of childbearing among women of reproductive age in Malawi and South Africa, using the most recent Demographic and Health Survey (DHS) from each country. The two countries are not only culturally different but also have demographic variance. The variations in fertility trends between these two countries, and elsewhere, suggest that there may be unique contextual influences that drive the phenomenon. Thus, the contrasting fertility backgrounds of these two countries provides insight into the influence of contextual factors of women's childbearing aspirations.

2. Literature Review

Comprehensively reviewing the empirical literature on fertility preferences are tricky for two reasons. First, there is confusion owing to different conceptualisation and measurement in the literature (Casterline and Agyei-Mensah, 2017; Philipov, 2011). Often the terms *desires* and *intentions* are conflated, despite being conceptually distinct. *Desires* or *preferences* are merely a wish to achieve some goals or ideals, whereas *intentions* go beyond that to include plans for action in implementing the said goals (Hayford and Agadjanian, 2012; Miller, 2011). Thus, *intentions* encapsulate the readiness to perform

behaviour (Philipov, 2011). This then suggests that what is most often being measured in demographic surveys are *desires* or *preferences*, not *intentions,* even though these items use the term *intend* generally to refer to both concepts (Hayford and Agadjanian, 2012). This is probably due to difficulties in measuring the 'commitment' component of intentions in large quantitative surveys.

Secondly, there is no established theoretical framework for studying reproductive motivation and behaviour in demography. Rather, most empirical demographic studies on fertility aspirations draw heavily from psychosocial models such as the Theory of Planned Behaviour (Ajzen, 1991) and the Traits-Desires-Intentions-Behaviour Framework (Miller, 1994)[1]. Most scholars transfer theories and empirical findings for fertility outcomes to studies of fertility motivations by exploring the impact of various factors on the formation of fertility aspirations (Philipov, 2011).

Nonetheless, several studies in both developed and developing countries have documented that fertility preferences and intentions predict fertility behaviour, therefore, this is something worth exploring (Hayford and Agadjanian, 2012; Kuhnt and Trappe 2013). This is evident in the extant literature where the terms *desires*, *preferences* and *intentions* are used interchangeably.

It is established that most women desire to have children (Matovu et al., 2017). Nevertheless, the timing of this important life event may

[1] Still, these frameworks have rarely been applied in sub-Saharan Africa – but see Kodzi et al. (2010) for sub-Saharan use (Hayford and Agadjanian, 2012).

differ from one woman to another because they live in varied social, cultural and economic contexts; their reproductive aspirations, including preferred child-timing, will be influenced by both micro and macro factors.

At the micro-level, age, parity and relationship status are identified as factors that influence women's fertility aspirations. Age is a strong predictor of women's reproductive behaviour, and by extension their fertility aspirations. This is due to the diminishing biological effect of age on overall fertility (Benzies et al., 2006; Deatsman, Vasilopoulos, and Rhoton-Vlasak, 2016). Women's ability to bear children shrinks with increasing age; therefore, their childbearing desire are professed relatively early (Heywood et al., 2016). In light of this, some significant age differentials in women's desired fertility timing are observed. Younger women want to delay childbearing and/or prolong subsequent births compared to older women (Abbas et al., 2013; Batyra, 2016; de Jonge et al., 2014). However, an inverse relationship has been observed in Ethiopia (Haile et al., 2016; Hailu and Gulte, 2016) as well as Uganda and Zimbabwe (McGuire and Stephenson, 2015).

Compared to South Africa, Malawi mimics the typical sub-Saharan African family formation pattern of early and near universal marriage and childbearing patterns (Palamuleni, 2011). The high prevalence of child marriages in Malawi, as opposed to the situation in South Africa, attests to the early onset of these family formation events (UNICEF, 2018). In lieu of the implicit normative expectation that women in Malawi enter marriage and parenthood early, the study hypothesizes the following:

Hypothesis 1 (H_1): Both young and older women in Malawi will desire more children beyond current parity, either early (within two years) or delayed (after two years);

Hypothesis 2 (H_2): Women in South Africa, regardless of age, will want to delay childbirth compared to their Malawian counterparts.

Some studies have shown that women's desired fertility timing is negatively associated with parity, in that women who have more living children are more likely to want to slowdown childbearing (de Jonge et al., 2014; McGuire and Stephenson, 2015). This is probably because women who already have living children may have already achieved, or may be close to achieving, their desired family size and, therefore, be under no pressure or in no hurry to become pregnant again (Yohannes et al., 2011). Overall, fertility levels are higher in Malawi than in South Africa. The total fertility rate (TFR) of Malawi is 5.43 children per woman. This is the average number of children that would be born per woman if all women lived to the end of their childbearing years and bear children according to a given fertility rate at each age. In contrast, the TFR of 2.6 children per woman in South Africa is the lowest in sub-Saharan Africa (NDoH et al., 2019; NSO and ICF, 2017; United Nations, 2019). Given that parity is dependent on the levels of fertility in a particular culture at a specific point in time, the study hypothesizes the following:

Hypothesis 3 (H_3): There will be a negative relationship between parity and the desired fertility timing among women in South Africa compared to women in Malawi.

Marriage signifies the socially acceptable period for sexual relationships and the context within which childbearing occurs in most African societies (Palamuleni, Kalule-Sabiti, and Makiwane, 2007). Consequently, women's relationship status has been found to influence their desires and decisions about their timing into motherhood (Benzies et al., 2006). Married or cohabiting women may be under greater social pressure to reproduce compared to single women. Thus, this group are more likely than others to desire children early or have short birth intervals. The norm of early and universal marriage and childbearing is more pervasive in Malawi than South Africa; therefore, the study hypothesizes the following:

Hypothesis 4 (H_4): Married or cohabiting women in Malawi will not be inclined to delay childbirth compared to women in South Africa.

Economics, educational attainment, wage employment and wealth significantly shape women's desired childbearing timing because of the direct and indirect costs associated with childbearing and childrearing (Wei, Xue, and Wang, 2018). Studies conducted in different places have found a significant association between higher education and delayed motherhood (Batyra, 2016; Benzies et al., 2006; Ferre, 2009) and protracted birth spacing (Haile et al., 2016; Hailu and Gulte, 2016; Khan et al., 2016). In this respect, higher education generally has a protective effect against desired early childbearing timing, as they are competing activities. However, other studies have observed the inverse relationship, where better-educated women want early and/or closely spaced births (de Jonge et al., 2014; McGuire and Stephenson, 2015). This could be attributed to the fact that women that are more educated would want to constrict

their childbearing years, to free up time to participate in other activities outside the home (de Jonge et al., 2014). Education acts as a competing activity to childbearing, and South African women have more access to education compared to those in Malawi (UNESCO Institute for Statistics, 2020), thus, the study hypothesizes the following:

Hypothesis 5 (H_5): There will be a greater desire among educated South African women to have a child earlier rather than after two years, compared to their Malawian counterparts.

Hypothesis 6 (H_6): There will be a greater desire among educated Malawian women than South African women to delay childbirth. This is because the few Malawian women who get access to higher education might be committed to completing it.

Like education, wage employment or pursuit of a career generally has a delaying impact on women's timing and transition to motherhood as well as birth spacing practices (Benzies et al., 2006; Haile et al., 2016). Moreover, household wealth or income is significantly associated with women's desired childbearing timing. Some studies have found that, compared to poorer women, those from middle and rich households are more likely to have accelerated childbearing and/or shortened birth spacing (Abbas et al., 2013; Yohannes et al., 2011). However, some studies observed the opposite (de Jonge et al., 2014; Hailu and Gulte, 2016; Khan et al., 2016; McGuire and Stephenson, 2015). Thus, in the literature, wealth index is documented to have a mixed effect on women's childbearing aspirations, including desired timing. Malawi is more agrarian than South Africa and is one of the most industrialized

economies in the African continent (USAID, 2018). Thus, it is expected that women who are involved in agrarian, rural economies will have the same outlook on life as those who are involved in industrial labour. Due to the differences between Malawian and South African women, the nature of work they do and the sources of their wealth, the study hypothesizes the following:

Hypothesis 7 (H_7): Women in Malawi who participate in the labour force will desire early childbirth compared to their South African counterparts and vice versa.

Hypothesis 8 (H_8): Both women in Malawi and South Africa with higher wealth indices will desire early childbirth for financial reasons.

Several studies have observed significant residential variations in women's transition into motherhood, with rural women at risk of early childbearing and/or shortened birth spacing (Batyra, 2016; Khan et al., 2016; Rabbi, 2014; Yohannes et al., 2011). The presence of extended family members in rural areas reduces the cost of childcare unlike in urban areas where parents are forced to juggle childcare with labour force participation and other activities like educational pursuits. However, owing to varying levels of urbanization in the two contexts, there would be differences in terms of the effect of place of residence between the two groups of women. Thus, the study hypothesizes the following:

Hypothesis 9 (H_9): Women in Malawi who reside in rural areas will desire to have a child early than women who reside in urban areas.

Hypothesis 10 (H_{10}): South African women who reside in rural areas will desire to have a child earlier than women who reside in urban areas.

Contraceptive use is known to have a mixed effect on women's childbearing timing. On one hand, women who use modern contraceptives practice longer or higher birth spacing compared to non-users (Hailu and Gulte, 2016; McGuire and Stephenson, 2015). However, in other contexts, the inverse has been observed (Abbas et al., 2013). Generally, contraceptive use is associated with restrictions in childbearing in the short-term (Matovu et al., 2017). Since, ipso facto, the use of contraception is intended to control births; the study hypothesizes the following:

Hypothesis 11 (H_{11}): In both Malawi and South Africa, women who use contraceptives will desire to delay childbearing.

Globally, women are increasingly having fewer children (United Nations, 2019). However, this declining fertility trend is unevenly distributed, as fertility remains relatively high in sub-Saharan Africa (United Nations, 2020). Even in sub-Saharan Africa, there are significant variations across and within countries. For instance, southern Africa, where both Malawi and South Africa are located, boasts comparatively lower fertility than the rest of the region (United Nations, 2019). Despite their geographical proximity, Malawi and South Africa represent two contrasting fertility contexts.

Thus, the two countries are not only culturally different but are also have a demographic variance. The variations in fertility trends

between these two countries, and elsewhere, suggest that there may be unique contextual influences that drive differences in the timing of fertility intentions. Moreover, research suggests that the timing of childbearing has been crucial in the current low fertility trend in Europe and other parts of the world (Sobotka, 2004). In this respect, countries wishing to emulate similar demographic trends (reducing fertility or population growth) will need to understand the contextual and socio-demographic characteristics that influence women's childbearing timing preferences.

In light of this, coupled with the empirical limitation in the existing literature, the present study aims to contribute a broader perspective to the literature in two ways. First, it aims to identify and compare the individual and socio-economic characteristics likely to influence reproductive women's decision to enter into motherhood and/or space births in the two countries in southern Africa. Secondly, the present study employs nationally representative samples from the two countries to show the influence of contextual factors in women's childbearing aspirations.

3. Data and methods

3.1 Data source and study population

South Africa and Malawi are the sixth and the twentieth most populous countries in Africa respectively (Population Reference Bureau, 2020). This study used data from the 2016 South African DHS (SADHS) and the 2015-16 Malawi DHS (MDHS). The cross-sectional designed DHS is conducted to deliver reliable estimates of

demographic and health indicators on various reproductive health issues such as fertility, sexual behaviour, maternal and child health. The multistage cluster sampling technique used for the survey was based on the sampling frame adopted from the 2008 Malawi Population and Housing Census, and the Census 2011 of the Republic of South Africa.

South Africa is located at the southern tip of the African continent and has the largest economy in the southern African region. The country's gross domestic product (GDP) is about 349 billion United States Dollars (US$) (IMF, 2020). The country has a population of approximately 59.3 million people, 68% of whom live in urban areas (NDoH et al., 2019; Population Reference Bureau, 2020). South Africa is divided into provinces for administrative purposes. It is a multi-racial, multi-cultural country with divergent practices, beliefs, and norms.

Malawi is a land-locked country in the southern African region with a population of approximately 19.1 million; over 80% of whom live in rural areas and engage in mainly agricultural activities (NSO and ICF, 2017; USAID, 2018). Malawi is made up of three regions, and has 10 prominent ethnic groups. The country is a uni-racial society with a multiplicity of cultures emanating from the diversity of ethnic groups with diverse cultural traditions, beliefs, and norms (Palamuleni, 2014).

A total of 8,514 and 24,562 women aged 15–49 years participated in the SADHS and MDHS, respectively. Women who were undecided or unsure of fertility timing, those sterilised or declared infecund and/or those who have never had sex were excluded from the analyses.

Hence, the study population comprised 5,947 and 19,071 women of reproductive age for South Africa and Malawi respectively.

3.2 Study variables

Outcome variable: The outcome variable for the study was fertility timing preference among women of reproductive age, 15–49 years. This item was derived from the questions asking respondents to indicate whether they desired more children and, if so, how long they would prefer to wait before the birth of a or another child. The responses considered were trichotomized as "wants no more", "wants within 2 years" and "wants after 2 years"; these are coded "0", "1" and "2" respectively. A response of "wants within 2 years" was considered as early timing desires (soon), whilst "wants after 2 years" was considered as delayed timing desires (later).

Explanatory variables: Socio-demographic factors identified from previous studies as influencing desired fertility timing are categorised into individual and structural covariates based on available data for this study. Individual-level covariates included age, education, employment and relationship status, age at first sex, contraceptive use and parity. Structural covariates included household wealth index, ethnicity, place and region of residence, and household size. Meanwhile, in South Africa, the predominantly spoken languages grouped into five (English, Afrikaans, Nguni, Sotho, Tshivenda/Xitsonga) were used as a proxy for the ethnicity variable in this study. All variables were measured at the nominal level.

3.3 Data analysis

The study analysed data on fertility timing preference of women of reproductive ages 15–49 years. Firstly, the distribution of socio-demographic characteristics of the respondents are presented using descriptive statistics. Secondly, separate bivariate analyses were carried out for each country to identify the respective independent variables influence on fertility timing. Lastly, separate multinomial logistic regression analyses were conducted to examine the influence of the explanatory variables on fertility timing preference while controlling for other variables. In brief, the model could be described as follows.

Assume Y_{ij} is the j[th] fertility timing preference of the i[th] woman; then, the multinomial logistic model could be described as:

$$y_{ij} = log_e\left(\frac{P(Y = j|X)}{P(Y = J|X)}\right) = \beta_{j0} + \beta_{j1}X_1 + \cdots + \beta_{jk}X_k;\ j = 0,1,2\ \&\ J = 0$$

Such that:

$$y_{ij} = \begin{cases} log_e\left(\frac{P(Y = 1|X)}{P(Y = 0|X)}\right) = \beta_{10} + \beta_{11}X_1 + \cdots + \beta_{1k}X_k, \text{j=1} \\ log_e\left(\frac{P(Y = 2|X)}{P(Y = 0|X)}\right) = \beta_{20} + \beta_{21}X_1 + \cdots + \beta_{2k}X_k, \text{j=2} \end{cases}$$

Where:

$$P(Y = j|X)\ is\ the\ probability\ of\ fertility\ timing$$

β_{jk} is the kth regression parameters of the j[th] fertility timing preference status; X_k the k[th] predictors (individual and structural explanatory variables).

The odds ratios (OR) and the 95% confidence interval (CI) are reported. The exponential function of regression coefficients is the OR, such that an OR greater than 1 implies that the probability of a woman wanting another child within two years or after two years is greater than the probability of wanting no more; otherwise, an OR less than 1. Importantly, provisions were made for weighing the data to adjust for differences in population sizes of each province/region in both countries. The weighted percentages are presented. All the results were considered statistically significant if $p<0.05$ and the analyses were conducted using SPSS version 25.

4. Results

4.1 Background characteristics of women

Table 1 shows the background characteristics of the respondents for the two countries. In South Africa, most women were aged between 25-29 (17.6%) and 30-34 years (17.8%), while most (23.7%) in Malawi were aged between 20–24 years. Regarding ethnic self-identification, Nguni women have the highest (42.6%) representation in South Africa, whereas Chewa women have the highest (34.1%) representation in Malawi.

Table 1: Sociodemographic characteristics of reproductive-aged women in South Africa and Malawi

Characteristics	South Africa n^ (%^^)	Malawi n^ (%^^)	Characteristics	South Africa n^ (%^^)	Malawi n^ (%^^)
Age			**Household Size**		
15-19	708 (11.1)	3616 (19.5)	≤2	986 (18.4)	1282 (7.1)
20-24	878 (15.4)	4462 (23.7)	3-5	2861 (49.2)	9840 (52.2)
25-29	1027 (17.6)	3451 (18.1)	≥6	2100 (32.4)	7949 (40.7)
30-34	1013 (17.8)	3057 (16.0)	**Ethnicity**		
35-39	819 (14.0)	2206 (11.0)	English	573 (12.3)	
40-44	750 (12.1)	1337 (7.0)	Afrikaans	520 (6.8)	
45-49	752 (12.0)	942 (4.8)	Nguni	2248 (42.6)	
Education			Sotho	2066 (28.8)	
No education	151 (2.3)	2049 (11.2)	Tshivenda/Xitsonga	540 (9.6)	
Primary	654 (9.5)	11705 (61.9)	Chewa		5573 (34.1)
Secondary	4515 (76.4)	4781 (23.7)	Tumbuka		1899 (8.7)
Higher	627 (11.8)	536 (3.1)	Lomwe		3587 (19.8)
Employment			Tonga		710 (1.8)
Unemployed	3849 (62.7)	6967 (35.5)	Yao		2225 (13.7)
Employed	2098 (37.3)	12104 (64.5)	Sena		967 (3.9)
Wealth Index			Nkonde		248 (0.8)
Poorer	2569 (40.1)	7089 (39.7)	Ngoni		2444 (12.0)
Middle	1375 (21.3)	3492 (18.5)	Mang'anja		431 (2.5)
Richer	2003 (38.7)	8490 (41.8)	Nyanga		391 (1.1)
Residence			Other		596 (1.7)
Urban	3351 (68.0)	3976 (18.8)	**Region**		
Rural	2596 (32.0)	15095 (81.2)	Western Cape	490 (12.5)	
Relationship			Eastern Cape	741 (11.3)	
Never Married	3235 (53.2)	3366 (17.7)	Northern Cape	554 (2.3)	
Ever Married	1877 (32.3)	14852 (78.0)	Free State	563 (4.9)	
Cohabiting	835 (14.5)	853 (4.3)	KwaZulu-Natal	800 (15.7)	
Age at First Sex			North West	659 (7.4)	
<15 years	795 (13.7)	4794 (25.6)	Gauteng	634 (28.2)	
≥15years	5152 (86.3)	14277 (74.4)	Mpumalanga	763 (8.3)	
Contraceptive			Limpopo	743 (9.4)	
Non-use	3052 (51.0)	10459 (55.0)	Northern region		3488 (10.5)
Use	2895 (49.0)	8612 (45.0)	Central region		6530 (42.9)
Parity			Southern region		9053 (46.5)
0	1182 (19.9)	3637 (19.8)			
1	1427 (24.9)	3336 (17.6)			
2	1577 (26.8)	3072 (16.1)			
3	947 (15.8)	2702 (13.9)			
≥4	814 (12.7)	6324 (32.6)			

n –number of women per group; ^unweighted frequency; ^^weighted percentage

Most (76.4%) of the women in South Africa had a secondary-level education, whereas the majority (61.9%) of women in Malawi had a primary education. More than half (62.7%) of the women in South Africa were unemployed, while nearly two-thirds (64.5%) of Malawian women were employed. Most South African women (40.1%) belonged to the 'poorer' household wealth category, while 41.8% of Malawian women belonged to the 'richer' household wealth category. Also, more than two-thirds (68.0%) of South African women lived in urban areas, while four-fifths (81.2%) of Malawian women lived in rural areas.

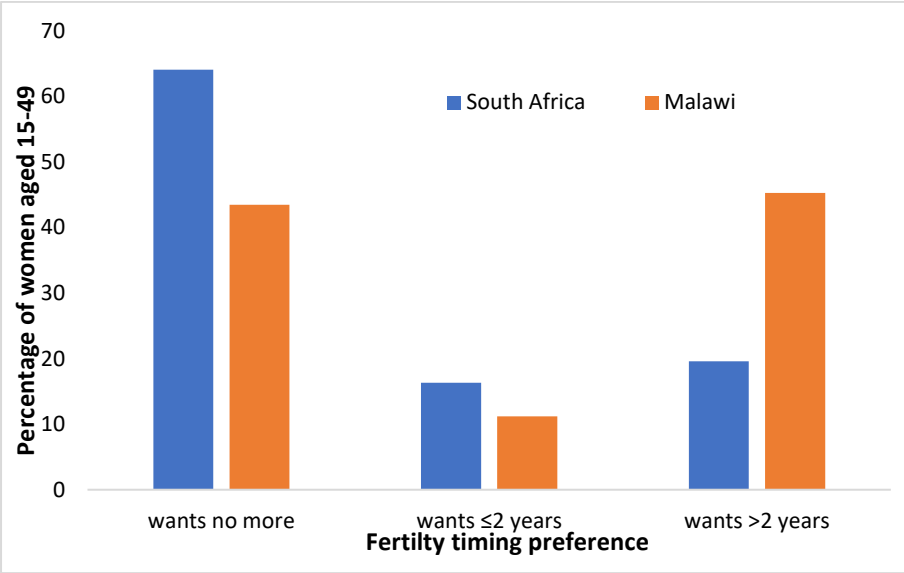
In South Africa, more than half (53.2%) of the women were never married; whereas, in Malawi, 78% of the women were ever married. Furthermore, 13.7% of the South African women had sex before age 15 in comparison to 25.6% of the Malawian women who had sex before age 15. More than half (51.0%) of South African women did not use contraceptives in comparison to 55% of Malawian women who also do not. Finally, most (26.8%) South African women had two children, whereas the majority (32.6%) of Malawian women have four or more children.

4.2 Pattern of women's fertility timing preference by country

Figure 1 reveals the pattern of preferred fertility timing among women in South Africa and Malawi. Slightly over one-third (35.9%) of the South African women reported childbearing desires compared to more than half (56.5%) of their Malawian counterparts. Among the women who had childbearing plans, most of the women reported the desire to delay childbearing by at least two years. While women in

South Africa (16.3%) had the highest percentage of those wanting a child within 2 years, Malawian women (45.3%) had the highest percentage of those with delayed fertility timing desires (wanting a child after 2 years). Of note, 64.1% of South Africa women wanted no more children compared to a smaller percentage of Malawian women (43.5%).

Figure 1: Percentage distribution of fertility timing preference by country



4.3 Factors influencing fertility timing preference among South African and Malawian women aged 15-49 years

Table 2 shows the results of the bivariate analyses using chi-square tests in exploring the association between socio-demographic factors and women's fertility timing preferences for both countries. The results showed that desired fertility timing was significantly associated with all the socio-demographic factors considered for the data for South Africa. Conversely, in Malawi, desired fertility timing was significantly associated with all socio-demographic factors considered, except for household wealth index.

Table 2: Percentage (weighted) distribution of women's fertility timing preference by selected explanatory characteristics

Characteristics	South Africa			Malawi			Characteristics	South Africa			Malawi		
	% A	% B	% C	% A	% B	% C		% A	% B	% C	% A	% B	% C
Age			<0.001*			<0.001*	**Ethnicity**			<0.001*			<0.001*
15-19	43.1	4.4	52.5	8.4	10.6	81.0	English	65.2	14.7	20.2			
20-24	46.3	12.5	41.2	17.3	15.2	67.6	Afrikaans	65.2	10.6	24.2			
25-29	53.9	20.3	25.9	39.1	14.2	46.6	Nguni	69.4	14.5	16.2			
30-34	63.3	24.5	12.2	66.6	9.8	23.6	Sotho	58.2	19.6	22.2			
35-39	72.9	23.4	3.7	83.1	7.7	9.1	Tshivenda/Xitsonga	56.4	20.4	23.2			
40-44	82.7	15.8	1.4	91.4	6.2	2.3	Chewa				40.3	11.8	48.0
45-49	93.4	6.2	0.5	95.3	2.6	2.1	Tumbuka				44.6	11.3	44.1
Education			<0.001*			<0.001*	Lomwe				47.9	10.3	41.8
No education	82.0	13.7	4.3	68.5	8.9	22.6	Tonga				35.1	15.4	49.6
Primary	79.9	12.8	7.3	44.0	11.0	45.1	Yao				44.5	12.2	43.3
Secondary	62.9	16.4	20.8	32.3	12.0	55.8	Sena				42.1	10.6	47.3
Higher	56.0	19.2	24.9	30.8	18.8	50.4	Nkonde				38.3	11.5	50.3
Employment			<0.001*			<0.001*	Ngoni				45.7	10.2	44.2
Unemployed	62.1	14.2	23.7	36.7	9.7	53.6	Mang'anja				43.9	7.9	48.2
Employed	67.6	19.7	12.7	47.3	12.1	40.7	Nyanga				41.8	9.5	48.8
Wealth Index			0.018*			0.250	Other				45.7	12.6	41.7
Poorer	66.8	15.7	17.5	43.9	10.7	45.5	**Region**			<0.001*			<0.001*
Middle	64.2	18.2	17.7	44.7	11.3	44.0	Western Cape	59.7	14.9	25.5			
Richer	61.3	15.9	22.8	42.7	11.7	45.6	Eastern Cape	73.5	10.8	15.7			
Residence			0.001*			0.003*	Northern Cape	67.8	12.1	20.1			
Urban	62.4	17.6	20.0	40.7	12.7	46.5	Free State	71.9	14.1	14.0			
Rural	67.7	13.5	18.8	44.2	10.9	45.0	KwaZulu-Natal	76.6	11.1	12.3			
Relationship			<0.001*			<0.001*	North West	62.4	19.0	18.6			
Never Married	62.2	10.5	27.3	9.7	8.6	81.7	Gauteng	58.4	20.5	21.2			
Ever Married	70.8	20.4	8.8	51.5	11.6	37.0	Mpumalanga	61.5	18.8	19.7			
Cohabiting	56.3	28.2	15.6	39.1	15.7	45.2	Limpopo	53.9	18.7	27.4			
Age at FS			<0.001*			<0.001*	Northern region				45.6	13.0	41.4
<15 years	59.1	10.1	30.8	36.6	9.4	54.0	Central region				40.1	11.0	48.9
≥15years	64.9	17.3	17.8	45.9	11.9	42.3	Southern region				46.2	11.0	42.8
Contraceptive			<0.001*			<0.001*							
Non-use	60.5	21.4	18.1	40.3	14.4	45.3							
Use	67.9	10.9	21.2	47.5	7.3	45.2							
Parity			<0.001*			<0.001*							
0	28.5	21.9	49.5	5.1	18.5	76.5							
1	49.4	26.5	24.2	14.7	17.2	68.2							
2	77.2	11.7	11.1	34.8	12.5	52.7							
3	84.8	11.1	4.1	52.7	8.5	38.8							
≥4	95.4	3.6	1.0	82.8	4.2	13.0							
Household Size			<0.001*			<0.001*							
≤2	53.4	31.9	14.7	23.4	32.4	44.2							
3-5	64.6	15.8	19.7	38.7	11.7	49.6							
≥6	69.5	8.2	22.3	53.2	6.9	39.9							

** p<0.05 (values based on chi-square test); n – number of women*; FS – first sex; A – want no more; B – want ≤2 years; C – want >2 years

In South Africa, as hypothesized (**H_2**), the likelihood of women wanting children early (within two years) significantly increased with age, peaking at 30-34 years (aOR=21.18, CI=12.32-36.40) before declining. However, the likelihood of wanting to delay childbirth (having children after two years) significantly decreased with age. Women aged 20-24 years (aOR=1.46, CI=1.11-1.92) and 45-49 years (aOR= 0.02, CI=0.01-0.07) respectively had 46% increased and 98% reduced risks of delaying childbirth relative to women aged 15-19 years (Table 3). Malawian data partially confirmed the study hypothesis (**H_1**) showing that the likelihood of women wanting children in the short-term increased with age. For instance, the desire for early childbirth was significantly higher at 25-29 years (aOR=4.31, CI=3.30-5.64) and lower at 45-49 years (aOR= 0.52, CI=0.31-0.86). Conversely, the desire to delay childbirth significantly decreased with age (Table 3).

Contrary to the study hypothesis (**H_4**), there were no differences between married and cohabiting women in relation to their desired fertility timing in the two countries. Table 3 shows that compared to single women, cohabiting (aOR=5.27, CI=4. 06-6.83) and ever married women (aOR=3.37, CI =2.69-4.22) in South Africa were more likely to desire more children early. This significant result is similar to the situation in Malawi (Table 3).

Table 3: Multinomial logistic models predicting fertility timing preference in South Africa and Malawi

	South Africa (n=5,947)		Malawi (n=19,071)	
Explanatory variable	**aOR (CI)$^{B\ vs\ A}$**	**aOR (CI)$^{C\ vs\ A}$**	**aOR (CI)$^{B\ vs\ A}$**	**aOR (CI)$^{C\ vs\ A}$**
Age	*15-19 - ref*			
20-24	7.05***	1.46**	2.83*	1.14
	(4.15 - 11.99)	(1.11 - 1.92)	(2.24 - 3.57)	(0.96 - 1.37)
25-29	17.32***	1.28	4.31*	0.67*
	(10.14 - 29.56)	(0.94 - 1.75)	(3.30 - 5.64)	(0.55 - 0.82)
30-34	21.18***	0.69*	3.73*	0.29*
	(12.32 - 36.40)	(0.48 - 0.99)	(2.79 - 4.99)	(0.24 - 0.37)
35-39	20.08***	0.21***	3.00*	0.11*
	(11.51 - 35.04)	(0.13 - 0.34)	(2.18 - 4.13)	(0.09 - 0.15)
40-44	11.81***	0.08***	1.86*	0.03*
	(6.68 - 20.91)	(0.04 - 0.16)	(1.29 - 2.68)	(0.02 - 0.04)
45-49	3.63***	0.02***	0.52*	0.02*
	(1.97 - 6.67)	(0.01 - 0.07)	(0.31 - 0.86)	(0.01 - 0.03)
Education	*No formal education - ref*			
Primary	1.16	0.62	0.99	1.06
	(0.60 - 2.21)	(0.23 - 1.68)	(0.81 - 1.22)	(0.91 - 1.23)
Secondary	1.15	1.23	0.66*	1.06
	(0.63 - 2.09)	(0.48 - 3.15)	(0.52 - 0.85)	(0.89 - 1.27)
Higher	1.11	1.85	0.60*	1.03
	(0.58 - 2.13)	(0.70 - 4.87)	(0.41 - 0.88)	(0.75 - 1.40)
Employment	*Unemployed – ref*			
Employed	1.15	1.16	1.49*	1.10*
	(0.96 - 1.39)	(0.95 - 1.41)	(1.31 - 1.68)	(1.01 - 1.20)
Wealth Index	*Poorer - ref*			
Middle	1.11	1.24	1.17	0.99
	(0.88 - 1.40)	(0.99 - 1.54)	(1.00 - 1.38)	(0.88 - 1.11)
Richer	0.87	1.22	1.15	0.98
	(0.67 - 1.13)	(0.96 - 1.55)	(0.99 - 1.34)	(0.88 - 1.09)
Residence	Rural - ref			
Urban	0.89	0.81	0.76*	0.69*
	(0.71 - 1.12)	(0.65 - 1.00)	(0.65 - 0.89)	(0.61 - 0.77)
Relationship	*Never - ref*			
Ever Married	3.37***	1.27	6.78*	1.52*
	(2.69 - 4.22)	(0.99 - 1.64)	(5.20 - 8.90)	(1.24 -1.86)
Cohabiting	5.27***	1.65***	11.12*	
	(4.06 - 6.83)	(1.25 - 2.18)	(7.76 - 15.94)	

	South Africa (n=5,947)		Malawi (n=19,071)	
Explanatory variable	**aOR (CI)$^{B\ vs\ A}$**	**aOR (CI)$^{C\ vs\ A}$**	**aOR (CI)$^{B\ vs\ A}$**	**aOR (CI)$^{C\ vs\ A}$**
Age at First Sex	≤14 years - ref			
>14 years	1.62**	1.19	0.89*	0.94
	(1.16 - 2.26)	(0.92 -1.54)	(0.80 - 0.99)	(0.81 - 1.08)
Contraceptive	*Non-use - ref*			
Used	0.43***	1.26*	0.65***	0.48***
	(0.36 - 0.52)	(1.05 - 1.51)	(0.59 -.0.71)	(0.42 - 0.54)
Parity	*0 - ref*			
1	0.24***	0.25***	0.07*	0.27*
	(0.18 - 0.31)	(0.19 - 0.32)	(0.05 - 0.09)	(0.21 - 0.34)
2	0.04***	0.09***	0.01*	0.10*
	(0.03 - 0.06)	(0.07 - 0.12)	(0.01 - 0.02)	(0.08 - 0.14)
3	0.02***	0.05***	0.01*	0.07*
	(0.02 - 0.04)	(0.03 - 0.08)	(0.00 - 0.01)	(0.06 - 0.10)
≥4	0.01***	0.02***	0.002*	0.04*
	(0.01 - 0.02)	(0.01 - 0.04)	(0.001-0.003)	(0.03 - 0.05)
Household Size	≤2 - ref			
3-5	0.81	1.47**	0.88	1.56*
	(0.65 - 1.02)	(1.13 - 1.92)	(0.71 - 1.10)	(1.28 -1.89)
≥6	0.54***	1.37*	0.58*	1.29*
	(0.42 - 0.71)	(1.03 - 1.81)	(0.46 - 0.73)	(1.06 - 1.59)
Ethnicity	*English - ref*		*Other - ref*	
Afrikaans	0.83	1.03		
	(0.51 - 1.33)	(0.81 - 1.72)		
Nguni	2.10***	1.34		
	(1.47 - 2.98)	(0.78 - 1.37)		
Sotho	2.27***	1.74**		
	(1.54 - 3.33)	(1.22 - 2.51)		
Tshivenda/Xitsonga	1.61*	1.11		
	(1.03 - 2.52)	(0.50 - 1.15)		
Chewa			0.80	0.66*
			(0.56 - 1.15)	(0.50 - 0.88)
Tumbuka			0.65*	0.69*
			(0.46 - 0.91)	(0.53 - 0.90)
Lomwe			0.57*	0.58*
			(0.39 - 0.83)	(0.43 - 0.77)
Tonga			0.86	0.89
			(0.57 - 1.29)	(0.65 - 1.22)
Yao			0.84	0.84
			(0.57 - 1.23)	(0.63 - 1.13)
Sena			0.95	1.18
			(0.61 - 1.46)	(0.85 - 1.64)

	South Africa (n=5,947)		Malawi (n=19,071)	
Explanatory variable	**aOR (CI)$^{B\ vs\ A}$**	**aOR (CI)$^{C\ vs\ A}$**	**aOR (CI)$^{B\ vs\ A}$**	**aOR (CI)$^{C\ vs\ A}$**
Nkonde			0.84	1.08
			(0.48 - 1.47)	(0.71 - 1.66)
Ngoni			0.62*	0.62*
			(0.43 - 0.91)	(0.47 - 0.82)
Mang'anja			0.77	1.12
			(0.45 - 1.32)	(0.76 - 1.63)
Nyanga			0.60*	0.74
			(0.37 - 0.99)	(0.52 - 1.06)
Region	*Limpopo - ref*		*Southern - ref*	
Western Cape	0.35***	0.58**		
	(0.23 - 0.53)	(0.39 - 0.85)		
Eastern Cape	0.33***	0.24***		
	(0.23 - 0.47)	(0.17 - 0.34)		
Northern Cape	0.26***	0.32***		
	(0.17 - 0.39)	(0.23 - 0.46)		
Free State	0.29***	0.22***		
	(0.20 - 0.43)	(0.15 - 0.33)		
KwaZulu-Natal	0.32***	0.17***		
	(0.22 - 0.46)	(0.12 - 0.24)		
North West	0.63**	0.45***		
	(0.45 - 0.88)	(0.32 - 0.63)		
Gauteng	0.54**	0.53**		
	(0.37 - 0.78)	(0.37 - 0.76)		
Mpumalanga	0.57**	0.40***		
	(0.41 - 0.80)	(0.29 - 0.55)		
Northern			1.17	1.03
			(0.92 - 1.49)	(0.86 - 1.24)
Central			0.84*	1.15*
			(0.71 - 0.99)	(1.02 - 1.30)
-2 Log Likelihood	**6909.05 (p < 0.001)**		**18561.27 (p < 0.001)**	

** p<0.05; ** p<0.01; *** p<0.001; n – number of women; aOR – adjusted odds ratio; CI – 95% confidence interval for OR;* A – want no more; B – want ≤2 years; C – want >2 years; ref – reference category

In Table 3, South African women who delayed their first sexual encounter were significantly more likely to desire children within two years (aOR=1.62, CI=1.16-2.26). However, the converse was observed in the case of Malawi as women who had delayed their first sexual

encounter were significantly less likely to desire early childbirth (aOR=0.89, CI=0.80–0.99).

As expected, corroborating hypothesis (**H_{11}**), South African women who used contraceptives were less likely to desire early childbirth (aOR=0.43, CI=0.36–0.52) but more likely to desire a delayed childbirth (aOR = 1.26, CI = 1.06–1.51). However, Malawian women who used contraceptives were less likely to desire early childbirth (aOR=0.65, CI=0.59–0.71) or delayed childbirth (aOR=0.48, CI=0.42–0.54).

Contrary to expectations (**H_3**), there were no differences in the effect of parity on fertility timing desires in the two countries. Among South African women, increased parity decreased desired fertility timing as they were less likely to want children either early or later. Similarly, increased parity significantly decreased women's early or delayed desires for children among women in Malawi. In particular, South African women who had at least four children were 0.01 and 0.02 times less likely to desire a child within and after two years, respectively. Likewise, compared to women with no children, Malawian women who had at least four children were 0.002 and 0.04 times less likely to desire a child within or after two years, respectively.

As hypothesized (**H_8**), women from middle income and richer households in both countries were significantly more likely to desire to have children both within and after two years as compared to their poorer counterparts, when only the structural variables were adjusted for (result not presented). However, when all the variables were controlled for, wealth index had no statistically significant effect on women's preferred childbirth timing. For instance, women from

middle-income households were more likely to desire to have children either early (aOR=1.11; CI=0.88-1.40) or delayed (aOR=1.24; CI=0.99-1.54) in South Africa; nearly the same non-significant findings were observed in Malawi.

As expected (**H_6**), women with increased education in Malawi were significantly less likely to desire to have children early. Women who had a secondary (aOR=0.66; CI=0.52-0.85) and higher (aOR=0.60; CI=0.41- 0.88) education level were respectively about 34% and 40% significantly less likely to desire a child within 2 years relative to their uneducated counterparts (Table 3). However, contrary to expectations (**H_5**), education was not significant for South African women though they were more likely to desire childbirth either early or later. Additionally, as hypothesized (**H_7**), employed women in Malawi were significantly more likely to want children either early (aOR=1.49; CI=1.31-1.68) and delayed (aOR=1.10; CI=1.01-1.20) (Table 3).

In South Africa, place of residence, contrary to hypothesis **H_{10}**, did not make any difference, but ethnicity influenced women's fertility timing desires (Table 3). For instance, compared to English-speaking, Sotho-speaking women were more likely to desire early (aOR=2.27; CI=1.54-3.33) and delayed (aOR=1.74; CI=1.22-2.51) childbirth. Malawian women who belonged to the Tumbuka (aOR=0.65; CI=0.46-0.91), Lomwe (aOR=0.57; CI=0.39-0.83) and Ngoni (aOR=0.62; CI=0.43-0.91) ethnic groups were significantly less likely to want children either early or delayed compared to women from the "Other" ethnic group. As hypothesised (**H_9**), urban women in Malawi were significantly less likely to want children whether early (aOR=0.76; CI=0.65-0.89) or delayed (aOR=0.69; CI=0.61-0.77) (Table 3).

Finally, in South Africa, women residing in almost every province except for Limpopo were less likely to desire a child, irrespective of the period (Table 3). However, only women who resided in the Central relative to the southern region of Malawi were significantly more likely to desire a delayed childbirth (aOR=1.15; CI=1.02 - 1.30) and less likely to desire an early childbirth (aOR=0.84; CI=0.71-0.99).

5. Discussion

Against the backdrop of the scarcity of studies on fertility timing preferences in sub-Saharan Africa, the present study examined and compared factors influencing fertility timing preferences among women of reproductive age in Malawi and South Africa using the most recent nationally representative DHS samples.

The results suggest that women in both countries have considerable differences in their desired fertility timing. Generally, more women in South Africa desire to stop childbearing altogether. Conversely, more women in Malawi have childbearing aspirations, with most wanting to postpone childbirth by at least two years. The fertility aspirations of women in both countries mirror the fertility contexts of their respective countries. For instance, South Africa has a lower total fertility rate compared to Malawi (Population Reference Bureau, 2020). This is evidenced by the fact that more South African women reported greater desire to stop childbearing or delay the timing; although the contrary is the case for Malawi.

Concerning the factors that affect preferred fertility timing, the results showed that while the effects of some factors are similar across the

two contexts, other factors are unique to each country. Firstly, both early (within two years) and delayed (after two years) desire for children significantly decreased with women's age in both countries. Nevertheless, the age profile of women with childbearing aspirations differed slightly in the two countries.

The age effect could be reflecting the fact that women profess childbearing aspirations relatively early but do not act on them until later in life. This is perhaps because of their simultaneous involvement in other competing activities to family formation such as pursuing higher education or participating in the labour force, while older women may have achieved their desired parity (de Jonge et al., 2014; Heywood et al., 2016; McGuire and Stephenson, 2015).

Higher wealth increased women's desire for children in both countries irrespective of the timing. This finding confirms the mixed effect of wealth on fertility timing in the literature (Abbas et al., 2013; Hailu and Gulte, 2016; Khan et al., 2016). Given the fact that the wealth index, education and labour force participation are all interrelated socio-economic factors, it may appear surprising to have these inconsistent findings regarding these factors across the two contexts. For example, women from middle and richer-income households in South Africa and Malawi were more likely to be educated than their counterparts in poorer households. This fact is attested to by the finding that in South Africa once wealth index and labour force participation are accounted for, education will have no significant effect on their desired timing of childbirth. Thus, the finding that wealthy South African women expressed the desire for children either early or later may be reflective of their desire to catch up on their family-building processes after

years of spending time to accumulate wealth. However, in the case of Malawi, fewer women attend school (UNESCO Institute for Statistics, 2020), this may be due to the fact that women may prefer to have children because they can care for them. Thus, the finding suggests that women's desire to procreate, either early or later, is significantly influenced by the availability of financial resources or support.

Concerning relationship status, cohabiting and married women in both countries had fertility aspirations, particularly within a two-year period. This is expected since women in a union or cohabiting are at a greater risk of exposure to sexual activity and pregnancy that could lead to accelerated timing of childbirth, whether intended or unintended (RamaRao et al., 2006). It is also significant to note that even though marriage occurs early and is almost universal in Malawi compared to South Africa, the two countries share a common cultural expectation that marriage forms the context for childbearing. Moreover, in most African cultures, childbirth is expected immediately after marriage or after moving in with a partner as a means to test the fecundity of women.

Age at sexual debut produced different effects on desired fertility timing in the two countries. In South Africa, women who initiated sexual activity after age 14 years (delayed sexual debut) were more likely to want children early (within two years). On the other hand, Malawian women who delayed sexual debut were less likely to want children early. Generally, women in Malawi initiate sexual intercourse earlier than their South African counterparts and Malawi is known for child marriages. Thus, it is plausible that Malawian women who delay initiation of sexual intercourse have taken advantage of the country's

free education for female children with its intention of keeping girls in school to raise both age of first sexual intercourse and subsequently age at marriage and childbirth (Inoue and Oketch, 2008).

In both countries, increased parity had a protective effect against childbearing aspirations, as women were less likely to want children either early or later. Thus, increased parity elevated women's desire to limit childbearing in both counties. As women reach their preferred family size, the desire to get pregnant again may diminish or cease altogether (Yohannes et al., 2011). The fertility literature is replete with studies that have shown emphatically that there is an inverse relationship between parity or the number of living children a woman has and her subsequent births and their timing (de Jonge et al., 2014; Ewemooje et al., 2020; McGuire and Stephenson, 2015). Thus, this commonality among South African and Malawian women about the effect of parity on the timing of fertility intentions is hardly surprising.

Increased household size had a protective effect against early desired fertility timing in both countries. The fact that desired fertility timing is delayed as the household size increased in both South Africa and Malawi reflects the role of cultural and economic factors in the childbearing decisions of couples or individual women. Household size may be reflecting the effect of the levels of fertility in a particular culture at a specific time, especially, in a pro-natalist culture like Malawi or parity in individual cases in which case one can expect a negative association between household size and delayed childbearing timing. However, household size could also be reflecting constraints in the housing market in a country like South Africa where the Black African majority are discriminated against in the housing

market or in the case of Malawi where housing constraints are a function of poverty.

Lastly, residence significantly affects women's desired fertility timing in both countries. In line with national trends, the results showed that women living in all other provinces in South Africa had lower childbearing desires, notwithstanding compared to those who lived in Limpopo (NDoH et al., 2019). This suggests that most women in South Africa, except for those mostly residing in Limpopo, have a desire to limit childbirth. In Malawi, however, women living in the Central region were significantly more likely to desire delayed childbearing. This is probably because as the most developed part of Malawi, hosting the capital city, women there may have a better knowledge of and access to reproductive information. Yet, the Central region of Malawi also has the second-highest fertility rate (NSO and ICF, 2017). This suggests that even though women from this area aspire to delay childbirth or lengthen birth intervals, once they do procreate, they do so in higher numbers.

The present study also identified a few factors that were unique to each country, suggesting some contextual influence. In South Africa, contraceptive use significantly increased women's desire to postpone childbearing. This finding supports previous studies that have reported the link between contraceptive use and postponement of the birth of a child (Creanga et al., 2011; Hailu and Gulte, 2016). On the other hand, contraceptive use significantly decreased women's desire for childbirth irrespective of the timing in Malawi. Our finding is unsurprising given that contraceptive use is a fertility-constraining behaviour (Cheng, 2011) and, therefore, its use suggests strong

motivation to limit or delay childbearing. It is plausible that due to their knowledge of, availability and use of contraceptives, South African women can achieve their desire of delaying childbirth.

In Malawi, increased education, employment, urban residence and ethnicity played significant roles in women's preferred fertility timing. Firstly, women with secondary level or higher educational attainment had a lower likelihood of desiring childbirth early. Since educated women are more likely to delay marriage, use contraceptives and have smaller family sizes (Olatoregun et al., 2014), it is not unusual that their desired fertility timing follows similar trends. Perhaps because higher education improves women's social and economic status and offers women access to non-childbearing activities, educated women may want to delay childbirth for personal development.

Secondly, employed women in Malawi were significantly more likely to desire childbirth, irrespective of the timing. Two possible explanations could be offered for this effect of employment on desire fertility timing. First, employment may provide women with the needed income and confidence to desire and plan for children (Testa and Stephany, 2017). Second, employed women who desire childbirth early may want to complete the process quickly and to continue with their economic pursuits. In the case of the opposite effects of labour force participation and education among women in Malawi, it is hardly surprising given the nature of work most Malawian women are likely to be involved in outside the home. It is significant to note that 80% of women in Malawi live and work in rural areas. Work in agrarian economies such as Malawi is in most cases compatible with family formation processes such as marriage and childbearing. However, the

fact that educated women in Malawi are less likely to want children either early or later reflects the commitment of the few women who get the chance through the government's free education policy for female children to attend educational institutions to make education a competing activity to family formation.

Thirdly, women of Chewa, Tumbuka, Lomwe and Ngoni ethnicities have significantly lower odds of desiring children irrespective of the timing, suggesting a general aspiration to stop childbearing. The only unifying parallel between these groups of women is that they all belong to a relatively high fertility context. Other than that, the ethnic groups are seemingly different. For instance, the Tumbukas are characterised as the most urbanised, educated and wealthy, while the Chewa and Lomwe are the opposite (Palamuleni, 2014). Socio-economic characteristics aside, these groups may not be that different as far as the cultural hypothesis is concerned. Culture, using ethnicity as a proxy, may be playing a role here in that while most African societies tend to have pronatalist expectations, these ethnic groups in Malawi may not necessarily place emphasis on children. Thus, shared norms, values, and attitudes towards fertility and fertility control among the different ethnic groups, irrespective of geographical locations or socio-economic characteristics, best explain this observed trend in childbearing motivations or aspirations (Palamuleni, 2014).

Lastly, urban women in both South Africa and Malawi reported less desire to have children either early or delayed, suggesting a strong desire to limit childbearing entirely. This corroborates findings in the general literature that suggest a lower risk of early childbearing and/or shortened birth spacing for urban women as a result of the cost of

raising children in the cities in the absence of extended kin members. Moreover, the social and economic life in urban centres presents urban women with alternative aspirations to childbirth (Batyra, 2016; Khan et al., 2016; Rabbi, 2014).

The study is not without its limitations. As a cross-sectional design, the analysed variables can only provide evidence of a statistical relationship but not a causal relationship between the variables and desired fertility timing. Besides, we cannot rule out recall bias since the study is based on self-reported data which we have no means of verifying. Also, the use of secondary data restricted our potential to sufficiently assess the influence of some characteristics such as child mortality, migration, and HIV infection as drivers of child stunting. However, the study has been strengthened using large nationally representative datasets.

6. Conclusion

Worldwide, fertility levels are declining, including sub-Saharan Africa. This trend has been engendered by changes in socio-demographic and psychological conditions, within this context of change, the present study examined the timing of fertility preference across two demographic contexts in southern Africa. Fundamentally, the study has underscored the fact women are not a homogeneous group and as such are motivated differently. The study has also shown that the changing socio-economic circumstances in a given context strongly shape patterns in reproductive aspirations, and ultimately reproductive behaviour among women. In conclusion, the present study has demonstrated that while sub-Saharan African societies are

undergoing major structural changes engendered by such modernising coordinates as education, urban living, modern contraceptives, wage employment etc., the pace of this transformation is not uniform across the region because of the different levels of development of the individual countries.

The findings of this study have some policy implications. Policies that promote the uptake of family planning among women should continue and be strengthened in both countries. Furthermore, the age differences in fertility timing desires imply that family planning programmes must be more targeted in both countries. For Malawi especially, the government should continue its efforts in investing in education, job creation and improving the status of women to increase contraceptive use among women and reduce their desire for additional children. This may require that the government policy which grants free education to Malawian girls be strengthened to ensure improved opportunities for girls and women outside of childbearing.

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The fertility transition in Africa: An examination of fertility levels, trends and spatial differentiation

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Abstract

Africa's sustained high fertility levels and unprecedented population increase are associated with poorer standards of living. Therefore, a broad categorization of Africa as a homogeneous region is not useful for population policy and implementation. This paper examines fertility differentials in Africa from 1960 to 2015. This study uses the K-means method to standardize selected fertility indicators and cluster countries according to their heterogeneity and homogeneity. Three clusters were revealed for each respective period with high, medium and low fertility. In the pre-transitional era during the 1960s more than half of countries (54%) had medium fertility levels, whereas Southern and Central Africa had the lowest fertility levels. During the 1990s and 2010s it was evident that the majority of countries were located in high and medium fertility clusters, representing the pervasiveness of the fertility decline. The Southern and Northern African countries (21%) were also experiencing or nearing replacement level fertility. The number of countries with low and medium fertility levels were increasing while those with high levels were simultaneously decreasing in 2010s. Each cluster forms a spatial unit in which appropriate demographic policy measures can be implemented. Thus, this would allow those regions with the same fertility level to share their knowledge and experiences as outlined in the 2030 Agenda for Sustainable Development.

Keywords: *fertility, transition, differentials, proximate determinants, Africa, regions*

1. Introduction

In 2015, Africa had the highest fertility in the world. The total fertility rate (TFR) was 4.72 children per woman. Europe, Asia and Latin America had a TFR of 1.60, 2.20 and 2.14 children per woman, respectively (UNDESA, 2017). In 2015, Africa had the highest population growth rate of 2.59% per annum. However, Europe, Asia and Latin America had growth rates of 0.10%, 1.05% and 1.13%, respectively (UNDESA, 2017). According to UNDESA projections the African population will grow from about 1.1 billion in 2015 to 4.5 billion in 2100 (UNDESA, 2017). High fertility levels have major social, economic and environmental implications. Undoubtedly, these sustained population growth rates can result in living standards moving in the trajectory of poverty. This situation is made worse by the fact that the majority of the least developing countries are located in sub–Saharan Africa (UNDESA, 2017).

Most studies refer to Africa as a homogenous continent (Chesnais, 1986; Dyson, 2013; Notestein, 1945). Several studies that attempt to show differentiation only make a distinction between North Africa and sub–Saharan Africa (Ahmed et al., 2016; Caldwell and Caldwell, 2002; Cohen, 1993; Garenne, 2008; Gebreselassie, 2011; Tabutin, Schoumaker and Rabenoro, 2004). However, UNDESA (2017) shows that Southern Africa always had lower fertility levels than North Africa. Undeniably, such simple differentiation on a large and diverse continent is not useful for fertility or population policy formulation and programme implementation. On the contrary, studies have shown that fertility levels in Africa have always differed i.e., during pre–transitional and transitional times due to proximate determinants of

fertility (Bongaarts, 2017; Mhloyi, 1988; Muza, 2019). However, analysis of pre-transitional fertility differentials prior to the mid–20th century might be difficult as it is incapacitated by lack of data because Africa, unlike Europe, did not benefit from historical parish registers. Moreover, fertility in Africa has also shown signs of regional clustering. There are also isolated cases or outliers in regions with lower fertility levels, such as Sudan in North Africa (Cohen, 1998), and high fertility levels, such as Mauritius in Eastern Africa (Prinz, 1992).

Conventional demographic transition theory links fertility differentials to varied socio-economic development levels. Some research attributed fertility differentials to culture and linguistic boundaries (Cleland and Wilson, 1987; Cleland, 2001), nuptiality factors (Coale, 1973; Hajnal, Leibenstein and Easterlin (1976), and proximate determinants (Bongaarts, 1978). Davis and Blake (1956) have argued that proximate determinants are mediated by background variables. Other scholars argue that fertility has always declined as a result of the adoption of contraceptive methods (Caldwell, 1997; Dyson, 2013). In general, the factors contributing to the fertility decline are complex; however, it can be hypothesised that even though Africa is diverse, the decline is a result of development and diffusion of contraceptive behaviour.

The demographic transition theory assumes fertility to decline rapidly and continuously once the process began in developing countries (Coale, 1973; Notestein, 1945). However, a significant number of countries in Africa have faced unique fertility transitions in which it has stalled. Indeed fertility stalling has raised questions about prospects of a future decline (Bongaarts, 2006; Bongaarts, 2017; Garenne, 2008).

In addition, the observed fertility decline has also been affected by other factors like poverty, HIV and AIDS, war, and high mortality rates (Garenne, 2008).

This study aims to provide evidence about the fertility transition in Africa. The specific objective of the study is to examine fertility differentials in African countries from 1960 – 2015 using selected fertility indicators such as the total fertility rate (TFR), crude birth rate (CBR) and net reproduction rate (NRR) by clustering countries from this period. Understanding fertility differentials will enable countries that share similar experiences to learn from each other. Furthermore, such endeavours will help in specifically meeting Agenda 2030 and the Sustainable Development Goals (SDGs) 1 and 3 to end poverty in all its forms everywhere and ensuring healthy lives as well as promoting well-being for all.

2. Literature Review

According to the demographic transition theory, fertility decline is brought about by modernisation (Coale, 1973; Notestein, 1945), however, Coale (1973) and Hajnal, Leibenstein and Easterlin (1976) both concur that in pre-transitional societies it was moderated through nuptiality factors. Although the demographic transition theory links the fertility decline to socio-economic development, other research points to the fact that fertility can decline in the absence of significant socio-economic development (Bongaarts, 2014; Coale, 1973). Thus, highlighting the importance of diffusion and linguistic boundaries. In addition, World Fertility Surveys in pre-transitional Latin America suggests that women did not necessarily desire a high

number of children (Bongaarts, 2014). In Africa, fertility started to decline, even when there were low levels of socio-economic development. Undeniably, access to modern methods of family planning are negatively associated with the fertility decline in African countries (Bongaarts, 2014; Cleland, Harbison and Shah, 2014; Oronje et al., 2013).

Other studies have highlighted the need to invest in education, especially for women (Goujon, Lutz and Samir, 2015; Lutz, Goujon and Kabat, 2015). This has empowered women and contributed to the low fertility rate. In contrast, some studies have shown that women are postponing childbearing, which initially decreases and then increases again when women begin childbearing later (Moultrie, Sayi and Timæus, 2012).

The TFR in Africa, differed from the 1960s, for example it was estimated at 4.5 in Gabon, 8.07 in Kenya and 8.2 children per woman in Rwanda, while the CBR ranged from above 50 live births per 1000 population in Kenya, Malawi, Sudan, Rwanda Zambia, Mali, Senegal, Cote d'Ivoire, Niger to as low as 34 live births per 1000 population in Gabon. From the 1970s to the 1990s a significant number of countries experienced an increase in fertility and a number of countries had also began a sustained fertility decline. Nonetheless, by 2010–2015, some countries in Northern and Southern Africa had experienced significant fertility declines to near replacement level while Central and Western Africa were lagging significantly (UNDESA, 2017)

Other factors which have contributed to the fertility decline include marriage, age at marriage, proportion of women married and duration

of marriage (Coale, 1973; Hajnal, Leibenstein & Easterlin, 1976; Mhloyi, 1988). All these influence the number of children born. Early and universal marriage by 25 years is common in most African countries. However, North Africa is exceptional and greater proportions of women have remained single by the age of 30 years. However, in Botswana, marriage was the least powerful proximate predictor of fertility since significant birth occurred outside marriage (Letamo, 1996; Letamo and Letamo, 2001). In some African countries polygyny is generally high and variable. McDonald (1985) found that it ranged from 10% in Lesotho to 67% in Senegal. Studies have found polygyny to be negatively associated with the use of contraception and positively associated with post–partum amenorrhea (Mhloyi, 1988; Rutaremwa et al., 2015). One can hypothesise that the overall effect of polygyny on fertility in preindustrial societies is negative.

Postpartum abstinence and anovulation are a result of breastfeeding practices in Africa (Bongaarts, 1978; 1982). Mhloyi (1988) reported that average sexual abstinence varied from 2.2 to 17.8 months in Tunisia and Benin, respectively. Extended male migration to urban areas and mines (diamond mines in South Africa from neighbouring countries) has also been noted to increase sexual abstinence (Notkola, Siiskonen and Shemeikka, 2016). On the contrary, long and almost universal breastfeeding practices averaging 18.4 months are observed across Africa (Mhloyi, 1988). These practices can happen simultaneously, however, postpartum abstinence tends to be shorter than postpartum anovulation. However, Bongaarts (1982), argues that the intensity and duration of breastfeeding is the most powerful predictor of natural fertility differentials. Similarly, Rutaremwa et al. (2015) and Chola and Michelo (2016) found that in Uganda and

Zambia, breastfeeding was the most critical fertility-inhibiting factor. In some cases, infant mortality can interrupt breastfeeding and postpartum amenorrhea resulting in child hoarding and replacement and consequently raise fertility. Mhloyi (1988) highlighted that in some African societies, couples practice sexual abstinence when certain child sickness occurs, e.g. measles. This can lead to further fertility inhibiting factors beyond post–partum, as reported by Bongaarts, Frank and Lesthaeghe (1984), although it is difficult to quantify such inhibiting effects.

A study of 18 African countries noted that 60% of fertility differentials can be explained by pathological sterility (Frank, 1983). Sterility ranged from a low of 3% (Bongaarts, Frank and Lesthaeghe, 1984) to a high of almost 40% in Central Africa (Frank, 1983), which is commonly referred in the literature as the 'infertility belt' (Collet et al., 1988; Inhorn, 1994; Larsen, 2003). It is difficult to quantify the effects of HIV/AIDS on fertility directly. one can hypothesise that prolonged illness might lead to reduced coitus frequency, sterility and the high use of contraceptives such as condoms which can reduce fertility. It is also possible that increased infant and child mortality from HIV/AIDS might increase fertility through child hoarding and replacement effects. The Southern African region has the highest prevalence of both HIV/AIDS, condoms use and lowest fertility in Africa (Bongaarts, 2017).

3. Data and methods

For this study data from UNDESA (2017) on global and regional population estimates from 1960 – 2015 was used for the analysis. The

study selected 48 countries with a total population of more than 1 million people in 2017. Small countries with a population of less than one million were excluded because population estimates errors are higher for populations that are smaller than those that are larger (Keilman, 1998; Randall and Coast, 2016). Also, Mauritius was excluded because it is a unique island and demographic outlier (Nair, 2014), and therefore affects clustering. The standard United Nations regional classification of African countries into five regions was adopted for this study (UNDESA, 2017).

The selection of data was not done arbitrarily but informed by the accuracy of the United Nations data population estimates and projections for Africa which are constantly updated at the two–year interval to keep at par with new data from censuses, demographic surveys and vital registration systems (Muza, 2019; UNDESA, 2017). Consequently, in the absence of reliable and accurate data by individual African countries, the United Nations population estimates and projections become useful in examining fertility dynamics in Africa in line with evidence–based policy formulation and planning. The following periods, 1960–65, 1990–95, 2010–15 were used to create cluster analysis (analysis 1, 2 and 3). The following demographic indicators were selected namely the TFR, CBR and NRR (see Table 1). CBR is the number of births over a given period divided by the person–years lived by the population over that period. It is expressed as the number of births per 1 000 population. TFR is the average number of live births a hypothetical cohort of women would have at the end of their reproductive period if they were subject during their whole lives to the fertility rates of a given period and if they were not subject to mortality. It is expressed as live births per woman. NRR is the average

number of daughters that female members of a birth cohort would bear during their reproductive life span if they were subjected throughout their lives to the observed age–specific fertility and mortality rates of the given period. It is expressed as the number of daughters per woman.

A cluster analysis of African countries based on the above selected fertility indicators was used. The K-means method has been chosen as the most suitable for clustering of African countries. In addition, this method allows the number of clusters to be pre–determined in advance. The two objectives of using the K-means method for clustering is to decrease total intra–cluster variance or the squared error function. The K–means clustering method involves several steps in computing. For instance, the first step involves classifying of objects into K–groups, where K is defined as the number of predetermined groups (Jain, 2010; Yüceşahin and Tulga, 2017). In the second step, the algorithm randomly selects K points as cluster centres. Thirdly, clustering was done by assigning objects to their nearest cluster distance according to the sum of squared distances (Euclidean distances) between items and a corresponding centroid. A centroid or mean of all objects in each cluster is calculated. The K–means was most appropriate because it considers homogeneity and heterogeneity of countries or spatial units and clusters them into groups. The method is appropriate when there is a large number of data. Moreover, the method chooses the initial clusters means by randomly choosing values within the same range as the highest and the lowest in the data values (Jain, 2010). The chosen data sets have different measurement units, therefore, they were standardised into

z–scores of +3 to –3 on a continuum line using SPSS version 21 (Yüceşahin and Tulga, 2017).

The K–mean does not have a global theoretical method to determine the ideal number of clusters (Jurun, Ratković and Ujević, 2017). several K–mean clusters were computed, and the outcomes are compared, and one outstanding output was selected based on predefined criterion. In this study, 2–5 clusters were computed based on the means of the selected demographic variables. Only 3 cluster for each analysis period produced acceptable results. Two cluster analysis were found to be too simplistic, while large clusters (4 and 6) minimises the error but increases the risk of overfitting. Some clusters had only one or two countries. Therefore, the three cluster results were chosen to be the most appropriate method. Also, analysis of variance F-statistics was computed to form groups that are different and to measure the contribution of each variable to the final cluster analysis.

Table 1: Selected fertility indicators of Africa 1960–1965, 1990–1995, 2010–2015

		Crude birth rate (per 1,000 population)			Total fertility rate (children per woman)			Net reproduction ratio (daughters per woman)		
		1960-65	1990-95	2010-15	1960-65	1990-95	2010-15	1960-65	1990-95	2010-15
Eastern Africa	Burundi	48.2	48.2	43.3	7.07	7.40	6.00	2.17	2.58	2.37
	Eritrea	48.3	39.4	34.3	6.82	6.20	4.40	2.00	2.17	1.96
	Ethiopia	48.0	46.7	33.6	6.90	7.09	4.63	2.04	2.50	2.00
	Kenya	51.0	40.2	33.1	8.07	5.65	4.10	2.84	2.12	1.83
	Madagascar	48.4	44.1	34.1	7.30	6.10	4.40	2.26	2.35	1.96
	Malawi	52.6	47.2	38.1	7.00	6.60	4.88	1.97	2.30	2.10
	Mozambique	49.2	45.9	40.4	6.90	6.10	5.45	1.88	2.05	2.21
	Rwanda	50.7	44.8	33.5	8.20	6.55	4.20	2.59	1.96	1.87
	Somalia	47.4	49.5	44.4	7.25	7.53	6.61	2.03	2.73	2.56
	South Sudan	51.3	46.6	37.3	6.75	6.65	5.15	1.70	2.22	2.00
	Uganda	49.3	50.1	43.9	7.05	7.06	5.91	2.35	2.51	2.47
	Tanzania	49.1	43.3	39.8	6.80	6.05	5.24	2.22	2.16	2.30
	Zambia	50.3	45.0	39.3	7.25	6.30	5.20	2.43	2.15	2.20
	Zimbabwe	48.2	35.8	35.6	7.30	4.77	4.00	2.73	1.64	1.72
Central Africa	Angola	54.5	51.9	43.7	7.60	7.10	5.95	2.03	2.27	2.51
	Cameroon	43.6	43.6	38.2	5.81	6.22	4.95	1.84	2.09	2.01
	CAR	43.8	40.6	37.3	5.90	5.70	5.10	1.70	1.90	1.90
	Chad	45.6	51.3	45.2	6.30	7.39	6.31	1.87	2.59	2.36
	Congo	42.6	38.1	36.8	5.99	5.21	4.86	2.15	1.96	2.13
	DRC	46.8	46.1	44.0	6.04	6.77	6.40	1.87	2.37	2.58
	E Guinea	41.3	41.6	36.0	5.67	5.97	4.99	1.62	2.20	2.02
	Gabon	34.3	36.3	31.3	4.59	5.22	4.00	1.41	2.01	1.77
Northern Africa	Algeria	49.5	28.8	25.3	7.65	4.12	2.96	2.55	1.30	1.38
	Egypt	45.6	30.1	28.5	6.65	4.12	3.38	2.20	1.55	1.58
	Libya	50.1	26.5	21.3	7.30	4.22	2.40	2.49	1.47	1.12
	Morocco	49.7	27.4	21.3	7.10	3.70	2.60	2.47	1.33	1.21
	Sudan	46.9	41.6	34.4	6.75	6.00	4.75	2.38	2.26	2.04
	Tunisia	45.2	22.9	19.1	6.99	2.98	2.25	2.26	1.09	1.07
Southern	Botswana	46.9	31.9	25.1	6.65	4.25	2.88	2.49	1.43	1.28
	Lesotho	42.3	34.3	28.7	5.81	4.70	3.26	2.04	1.74	1.35
	Namibia	42.3	36.9	30.4	6.20	4.91	3.60	2.21	1.82	1.62
	South Africa	39.7	27.3	22.0	6.00	3.34	2.55	2.30	1.28	1.13
	Swaziland	47.9	39.5	30.2	6.75	5.20	3.30	2.27	1.76	1.39
Western Africa	Benin	45.3	45.3	38.4	6.42	6.56	5.22	1.80	2.35	2.14
	Burkina Faso	47.2	47.1	40.8	6.35	6.93	5.65	1.71	2.38	2.29
	Côte d'Ivoire	54.6	42.5	37.7	7.76	6.41	5.14	2.23	2.11	1.98
	Gambia	49.7	46.9	41.2	5.70	6.08	5.62	1.47	2.34	2.37
	Ghana	47.3	37.7	32.7	6.84	5.34	4.18	2.27	1.99	1.77
	Guinea	45.6	45.8	37.5	6.15	6.51	5.13	1.67	2.26	2.09
	Guinea-Bissau	42.0	45.1	38.4	5.95	6.50	4.90	1.74	2.24	1.95
	Liberia	49.2	44.1	35.8	6.47	6.27	4.83	1.81	2.19	2.02
	Mali	50.1	48.9	44.7	7.00	7.15	6.35	1.53	2.31	2.48
	Mauritania	48.4	40.3	35.5	6.79	5.91	4.88	2.19	2.29	2.07
	Niger	58.3	55.2	49.2	7.50	7.75	7.40	1.96	2.59	2.98
	Nigeria	46.2	43.7	40.5	6.35	6.37	5.74	1.81	2.05	2.12
	Senegal	50.3	42.0	37.6	7.10	6.28	5.00	2.03	2.27	2.23
	Sierra Leone	47.9	46.7	37.3	6.25	6.69	4.84	1.54	1.83	1.82
	Togo	47.7	40.8	35.8	6.65	6.02	4.69	2.07	2.13	1.96

Source: UNDESA (2017)

4. Results

Table 2 shows country cluster membership for respective periods (1960–65, 1990-95 and 2010–15). The z–score averages (final cluster centres) of the fertility variables were presented in Table 3. Moreover, the z–scores in Table 3, have been converted into bar graphs in Figures 1a, 1b, 1c to demonstrate cluster differences visually. Figure 2a, 2b and 2c show the geographical and spatial distribution of countries for the respective analysis periods. In analysis 1 (1960–65), a total of 13 (27.1%) out of 48 countries were assigned to cluster 1/1. Cluster 2/1 and cluster 3/1 consisted of 26 (54.2%) and 9 (18.8%) out 48 countries, respectively, (see Table 2). In analysis 2, which covered the period 1990/95, a total of 28 (58.3%), 13 (27.1%) and 7 (14.6%) out of 48 countries were assigned to clusters 1/2, 2/2, and 3/2, respectively. On the other hand, in analysis 3 which covered the period 2010–15, 10 (20.8%), 28 (58.3%) and 10 (20.8%) out of 48 countries were assigned to cluster 1/3, 2/3 and 3/3, respectively.

Table 2: Cluster memberships of African countries obtained from analysis 1 (1960–65), analysis 2 (1990–95), analysis 3 (2010–2015)

Region	Country	Analysis 1 (1960-65)	Analysis 2 (1990-95)	Analysis 3 (2010-15)
Eastern	Burundi	2	1	1
	Eritrea	2	1	2
	Ethiopia	2	1	2
	Kenya	1	2	2
	Madagascar	1	1	2
	Malawi	2	1	2
	Mozambique	2	2	2
	Rwanda	1	2	2
	Somalia	2	1	1
	South Sudan	2	1	2
	Uganda	1	1	1
	Tanzania	2	1	2
	Zambia	1	1	2
	Zimbabwe	1	2	2
Central	Angola	1	1	1
	Cameroon	3	1	2
	CAR	3	2	2
	Chad	2	1	1
	Congo	3	2	2
	DRC	2	1	1
	Equatorial Guinea	3	2	2
	Gabon	3	2	2
Northern	Algeria	1	3	3
	Egypt	2	3	3
	Libya	1	3	3
	Morocco	1	3	3
	Sudan	2	1	2
	Tunisia	2	3	3
Southern	Botswana	1	3	3
	Lesotho	3	2	3
	Namibia	3	2	3
	South Africa	3	3	3
	Swaziland	2	2	3
Western	Benin	2	1	2
	Burkina Faso	2	1	1
	Côte d'Ivoire	1	1	2
	Gambia	2	1	1
	Ghana	2	2	2
	Guinea	2	1	2
	Guinea-Bissau	3	1	2
	Liberia	2	1	2
	Mali	2	1	1
	Mauritania	2	1	2
	Niger	1	1	1
	Nigeria	2	1	2
	Senegal	2	1	2
	Sierra Leone	2	2	2
	Togo	2	1	2

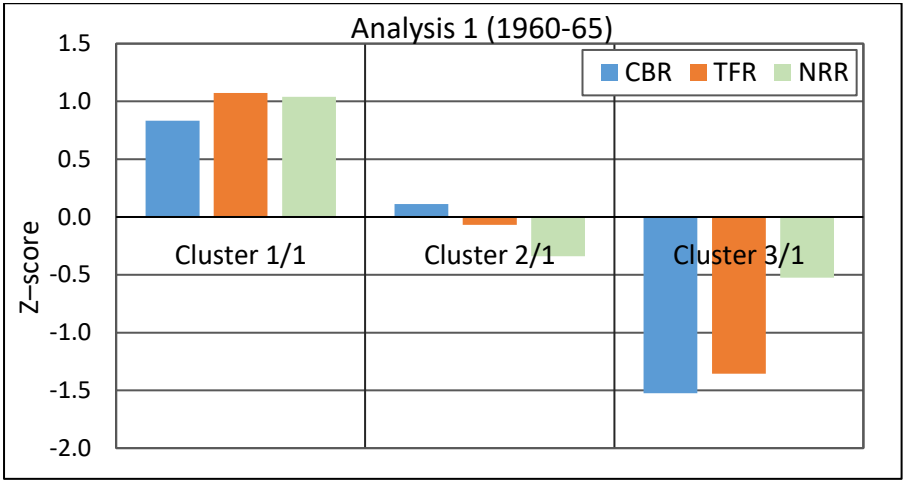
Source: UNDESA (2017), own calculation

Table 3. Final cluster centres from Cluster analysis 1 (1960–65), 2 (1990–95) and 3 (2010–2015, (n=48)

			Fertility Indicators			
			Crude birth rate	Total fertility rate	Net reproduction ratio	Number of countries (n=48)
Analysis 1 1960-65	Z-score	Cluster 1/1	0.83	1.07	1.04	13
		Cluster 2/1	0.11	-0.07	-0.34	26
		Cluster 3/1	-1.53	-1.35	-0.52	9
	Anova test	F value	40.92	46.10	15.99	
		P	0.003	0.001	0.81	
Analysis 2 1990-95	Z-score	Cluster 1/2	0.58	0.62	0.62	28
		Cluster 2/2	-0.24	-0.33	-0.50	13
		Cluster 3/2	-1.89	-1.86	-1.56	7
	Anova test	F value	68.27	76.05	44.20	
		P	0.001	0.001	0.001	
Analysis 3 2010-15	Z-score	Cluster 1/3	1.23	1.28	1.26	10
		Cluster 2/3	0.11	0.09	0.10	28
		Cluster 3/3	-1.54	-1.53	-1.54	10
	Anova Test	F value	114.89	128.53	128.50	
		P	0.001	0.001	0.001	

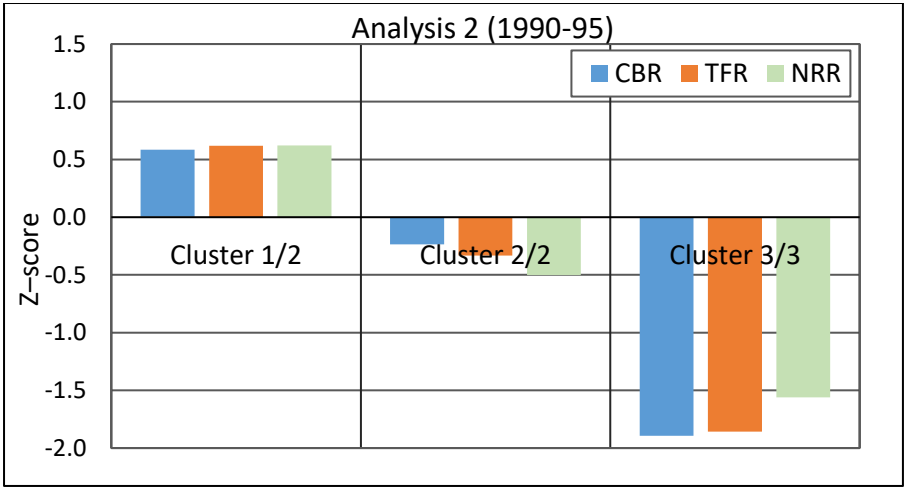
Source: (UNDESA, 2017), own calculation

Figure 1a: Z–score bar graphs, analysis 1 (1960–1965), Africa



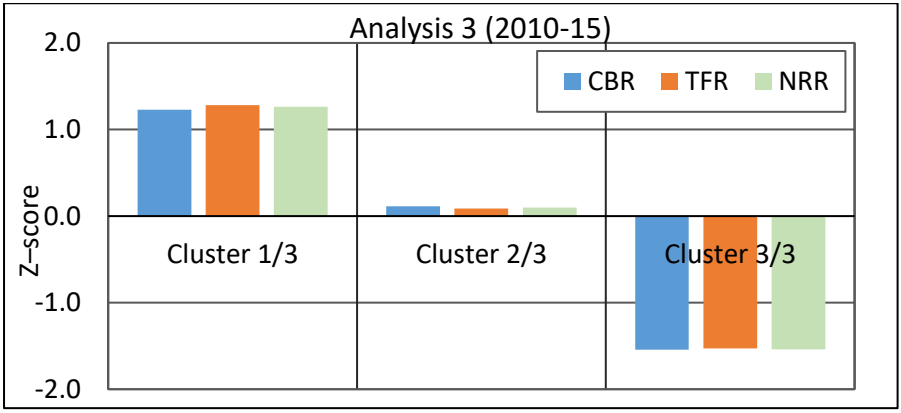
Source: UNDESA (2017), own calculation

Figure 1b: Z–score bar graphs, analysis 2 (1990–1995), Africa



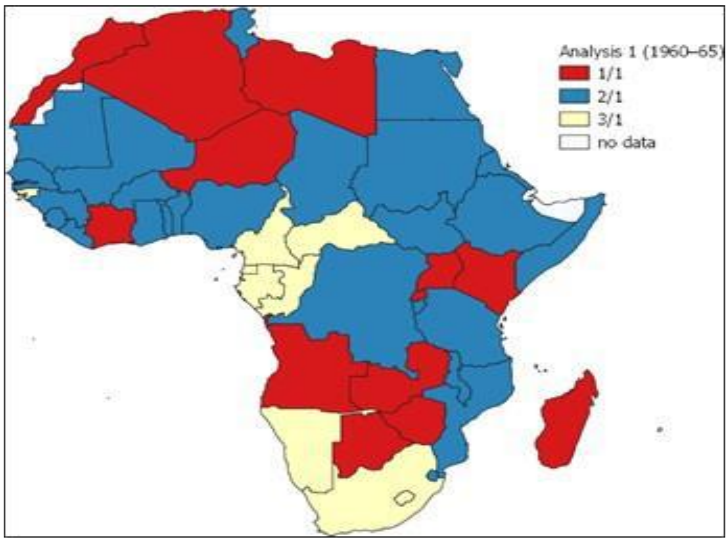
Source: UNDESA (2017), own calculation

Figure 1c: Z–score bar graphs, analysis 3 (2010–2015), Africa



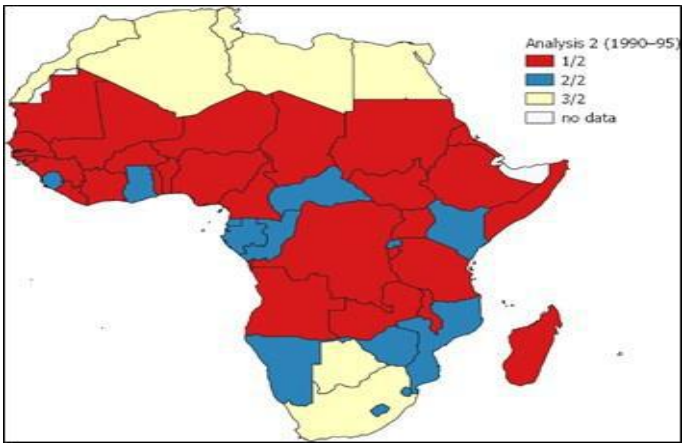
Source: UNDESA (2017), own calculation

Figure 2a: Countries spatial distribution of fertility indicators, analysis 1 (1960–1965), Africa



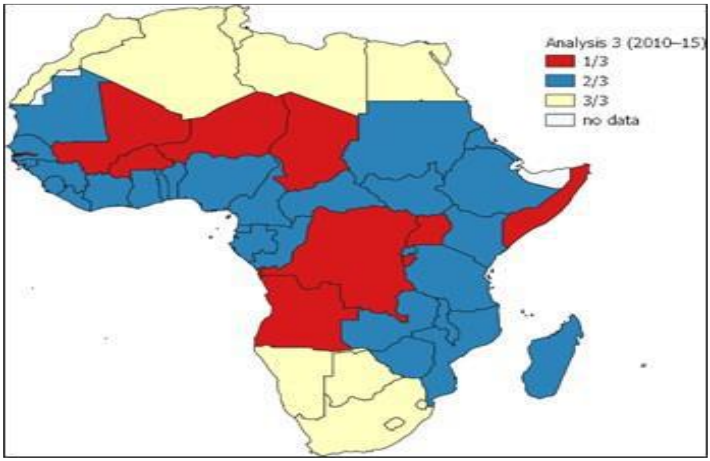
Source: UNDESA (2017), own calculation

Figure 2b: Countries spatial distribution of fertility indicators, analysis 2 (1990–1995), Africa



Source: UNDESA (2017), own calculation

Figure 2c: Countries spatial distribution of fertility indicators, analysis 3 (2010–2015), Africa



Source: UNDESA (2017), own calculation

It is imperative to outline at the very onset that the description and presentation of results using high, medium and low are merely meant to enable comparison of fertility differentials (see Figure 1a, 1b, 1c, 2a, 2b, 2c, Table 3). The results from analysis 1 (1960–65) shows that the spatial distribution and clustering of fertility levels of African countries in 1960–65. Cluster 1/1 was characterised by high positive z–score of CBR, TFR and NRR as compared to clusters 2/1 and 3/1, respectively. Cluster 3/1 was characterised by negative z–score of CBR, TFR and NRR. The fertility levels of cluster 3/1 was lower than the other clusters. This cluster consists of Southern and Central African countries, Lesotho, Namibia, South Africa, Equatorial Guinea, CAR, Congo, Cameron and Guinea Bissau. Cluster 2/1 was sandwiched between the two clusters as described above, with both medium negative and positive z–scores close to zero. A higher CBR score means that more children are being born into the general population, higher TFR z–score means more children are born per woman, and higher NRR means that more daughters are born per woman who survive to the ages of their mothers and vice-versa for low CBR, TFR and NRR.

The results from analysis 2 (1990 –95) reveal that there are similarities and differences in fertility clustering in Africa (middle panel Figure 1b, 2b and Table 2). Cluster 1/2 shows that the majority of the countries had high positive z–score of CBR, TFR and NRR. This group consisted of 15 out of 17 West African countries, and 10 out of 14 countries from Eastern Africa, two from middle Africa and surprisingly, Sudan from North Africa was also in this group. Cluster 3/2 is the opposite of 1/2 as it had the highest negative z–scores of CBR, TFR, and NRR. Cluster 3/2 consisted of South Africa, Botswana and all North African countries except Sudan. The group had experienced significant fertility decline.

Cluster 2/2 is in the middle of 1/2 and 3/2 with slightly negative z scores of CBR, TFR and NRR. The countries in cluster 2/2 had just past the early stages of the fertility decline and are approaching the middle stages. In short, the countries in cluster 1/2 are in the early stages of fertility decline, and some of the countries are still in the pre-transitional stage. Countries in cluster 2/2 are approaching the middle of the fertility transition. Lastly, countries in cluster 3/2 have just passed the middle of the fertility transition and are working their way towards replacement fertility. The results further reveal that a significant number of countries moved from cluster 2/1 in 1960–65 to cluster 1/2 in 1990–95 (see Table 3), probably as a result of fertility increase in some countries.

The results in analysis 3 show the fertility levels clustering of countries in Africa from 2010–15. Cluster 1/3 reveals high positive z–score of CBR, TFR and NRR. These countries are now in the early stages of fertility decline. The majority of countries (28/48) are in cluster 2/3 (middle cluster) with a slightly positive CBR, TFR and NRR. Cluster 3/3 is the contrast of cluster 3/1 with high negative z–scores of CBR, TFR and NRR. The analysis also reveals that the number of the countries in cluster 1/2 decreased from 28 to 10 between 1990–95 and 2010–15, respectively, while countries in cluster 2/3 (middle cluster) simultaneously increased from 13 in 1990 to 28 in 2010–15, respectively. The countries in cluster 3/3 also increased from 7 in 1990 to 10 in 2010–15. Therefore, it can be said that countries are moving from the pre–transitional phase to the middle and later stages of the fertility transition, which shows that countries are undergoing fertility transition at different times and pace.

5. Discussion

The study examined fertility levels, trends, and differentials in Africa for 1960 –2015 and grouped them into clusters for the respective periods. The findings of this research demonstrate that fertility differentials using CBR, TFR and NRR can be spatially grouped into 3 distinct clusters (high, medium, low) for each period 1960–65, 1990–95 and 2010–15. The differences and similarities in fertility are present in the pre-transitional (1960–65) to the transitional phases (1990–95, 2010–15). Moreover, during the specified periods, countries moved from the pre–transitional stage to the transitional stages at different paces, creating further differences and similarities in the fertility transition. The movement from high to low fertility can be explained by the demographic transition theory (Dyson, 2013; Notestein, 1945). Countries or regional fertility differentials during the fertility pre–transitional and transitional period can be explained by the proximate determinants of fertility and adoption of contraception (Bongaarts, 1978; Bongaarts, Frank and Lesthaeghe, 1984). However, Davis and Blake (1956) argue that the socio-economic factors operate through proximate levels. Nonetheless, the evidence points to the fact that most countries are moving towards low fertility, which might create a homogenization of fertility at low levels in the future beyond 2010–15. However, such an analysis was beyond the scope of this paper. The increased survival chances of mothers are also recognized in initially increasing fertility before the adoption of modern contraceptives.

In the period 1960–65 the spatial differentiation of fertility into high, medium and low clusters can be explained by proximate determinants of fertility, since this period can be classified as a pre-transitional

period characterised by natural fertility regimes (Henry, 1961), as only a few selected countries in Northern and Southern Africa had started experiencing fertility decline for instance, Namibia (Notkola and Siiskonen, 2016), South Africa (Moultrie and Timæus, 2003) and Egypt (Tabutin et al., 2005). Bongaarts (1978; 1982) and Bongaarts, Frank and Lesthaeghe (1984) had argued that fertility differentials in pre–transitional societies can be explained by proximate determinants. Of these proximate determinants marriage (sexual union) and postpartum infecundability is the most important in pre-transitional societies. Nonetheless, In the 1960s the majority of countries (54%) had medium fertility levels. This is a surprise finding as most of the countries were following natural fertility and one would have expected to find high fertility for most. Similar country fertility differentials were also found by Hajnal, Leibenstein and Easterlin (1976) and Coale (1973) during the historical fertility transition in Europe. They argued that European regional pre–transitional fertility differentials were moderated by different nuptiality factors. The clustering of few countries with moderate but high fertility shows the importance of proximate determinants that can promote higher fertility than the African average.

However, countries with the lowest fertility are mostly located in the "*Central African infertility belt''* and Southern Africa (Cameroon, CAR, Congo, Equatorial Guinea, Gabon, Lesotho Namibia, South Africa and Guinea Bissau). In the 1960s, low fertility in Central Africa was presumably caused by unprecedented high sterility as a result of sexually transmitted infections (STIs). Studies have shown than sterility in the *African "infertility belt''* ranged from 10–50% (Larsen, 2003), whereas Bongaarts (1978) reported that 3% is the standard

natural sterility in most countries. The clustering of Southern African countries which share borders might be explained by diffusion and early adoption of protective behaviours in the 1960s in Namibia (Notkola, Siiskonen, and Shemeikka, 2016) and South Africa (Caldwell and Caldwell, 1993; Moultrie and Timæus, 2003). Low fertility in South Africa can also partly be explained by higher percentages (10–20%) of the White population, which by the 1960s were almost at replacement level (Chimere-Dan, 1993). Lastly, for Lesotho, low fertility could have been affected by Lesotho's high rates of male migration to South Africa, which affects marriage and sexual exposure and has a consequent depressant effect on fertility. This is consistent with Gordon (1981, cited in Mhloyi, 1986), who reported that approximately 40–60% of wives in Lesotho had husbands who had migrated to South Africa. This is also consistent with studies conducted in Namibia (Notkola and Siiskonen, 2016)

In the 1990s there were three distinct clusters with the majority of countries (58%) experiencing high fertility levels. This might be a surprise finding given that the majority of countries in Africa had started to witness a fertility decline. This finding can presumably be explained by the fact that 17 Western and 8 Eastern African countries experienced later fertility declines than those in the Southern and Northern regions. This is consistent with findings by Cohen (1998) who argue that the fertility decline in Western and Central Africa were lagging. Such fertility differentials can be explained by contraceptive prevalence and unmet need for family planning (Bongaarts, 2014). Consequently, countries with high fertility levels have low contraceptive use and high unmet need for family planning and vice versa (Bongaarts, 2014). Moreover, the availability of STI antibiotics in

the infertility belt and the decline of secondary sterility might also have caused fertility to rise (Inhorn, 1994). Mhloyi (1988) also noted that the following proximate determinants: reduction in breastfeeding duration, sexual abstinence practices during breasting feeding, abstinence during infant and child sickness, might temporarily lead to fertility increase in some African countries. It is plausible that high fertility might be encouraged by a high number of potential daughters surviving to be mothers leading to population momentum. The majority of the countries in this cluster might be in the pre-transitional or early stages of the fertility decline.

Countries in the medium cluster had experienced significant fertility decline as a result of socio-economic development and adoption of fertility limiting practices. This is consistent with the demographic transition theory (Dyson, 2013; Notestein, 1945). However, countries in Africa have experienced a fertility decline at low levels of socio-economic development using modern methods of contraceptives (Dyson, 2013; Muza, 2019). Studies have also noted that development factors such as female education, industrialisation and urbanisation have facilitated the diffusion of access to contraception (ibid). Other factors such as widowhood and marital dissolution might not be useful as remarriages occur very quickly in Africa (Mhloyi, 1988). Africa has also presented a unique transition, for example, using proximate determinants, it was found that fertility in Botswana happened outside marriage. Nonetheless, it means that the level of countries development and availability of family planning services is inversely related to fertility.

In 1990–95 the study revealed that very few countries had low fertility. These countries have progressed in the fertility transition even though they have not yet reached replacement level of fertility. These countries include Botswana, South Africa and all North African countries except Sudan. It is surprising that Kenya was not found in this cluster even though it was the first African country to introduce family planning in the 1960s (Bongaarts, 2014; Muza, 2019).

In 2015, few Western and Central African countries had high fertility levels. This represents regional clustering of fertility patterns. Similarly, such regional fertility clusters were also found in European historical transitions (Coale and Watkins, 1986) and also in Asia (Attané and Barbieri, 2009; Véron, 2008). The countries in this cluster still experience high TFR, NRR and CBR. This is presumably due to these countries still experiencing a high infant and child mortality as compared to other countries. The birth intervals in this cluster are still small, age at marriage is still low and coupled with high marital rates, such populations will experience high fertility rates in comparison to other regions. These represent some or most of the countries in the early stages of the fertility transition.

In 2010–15, the majority of countries were in the middle stage of the fertility transition. Fertility is influenced by modernisation, which encourages and engenders less demand for children and adoption of contraceptive behaviours. Fertility has declined at low levels of modernisation (Bongaarts, 2014) and this means that other factors could have influenced the fertility decline, such as communication (ideation, diffusion) (Cleland and Wilson, 1987). However, many studies have noted that a significant number of countries have

experienced fertility stagnation or stalling (Bongaarts, 2006; Garenne, 2008; Goujon, Lutz and Samir, 2015; Lutz, Goujon and Kabat, 2015).

Fertility stagnation might have been caused partly by an initial decline at low levels of socio-economic development. Studies have noted the need for further structural socio–economic development to facilitate less demand for children and increase access and uptake of family planning services. For instance, in Zimbabwe fertility increased from 3.3 to 3.8 children per woman between 2002 and 2012, respectively, and women postponed childbearing during the period of economic hyperinflation (2007/8) and increased their childbearing when the economy stabilised in 2009 (Zimbabwe National Statistics Agency and ICF International, 2016). Other scholars emphasised the importance of education in fertility stagnation (Goujon, Lutz and Samir, 2015; Lutz, Goujon and Kabat, 2015). Lutz, Goujon and Kabat (2015) argued that Economic Structural Adjustment Programs (SAPS) introduced in the 1990s have caused a drop in education enrolment and completion rates among women resulting in these birth cohorts later experiencing higher fertility levels. This is also related to the fact that the birth cohorts affected by economic structural adjustment programs experience higher infant and child mortality than birth cohorts not affected. The demographic transition theory holds that low mortality is necessary for fertility decline (Kirk, 1996; Reher, 2004). The number of surviving children is more important than the number of children ever born. Hence mortality decline is a prerequisite. Once parents realise that their families are growing, they initiate family planning methods. Reher (2004: 25) notes that "within this context fertility control can be seen as an attempt to maintain family size, not decrease". Notkola and Siiskonen (2016) highlighted that the HIV

pandemic made women postpone childbearing, however, the availability of drugs made fertility increase in Namibia. Similar arguments can be extended to African countries ravaged by HIV and AIDS. Fertility stagnation might also be related to the tempo and quantum effects of fertility decline. The majority of women might temporarily postpone fertility in pursuit of education or laws that raise the age of entry into marriage, but women can subsequently be able to have the desired number of children when childbearing resumes. Median ages of childbearing have risen in most countries.

In 2010-15, countries with the lowest fertility were all located in Southern and Northern Africa. However, Sudan was absent from the North African region. The results are consistent with historical fertility transition where other countries lagged behind, for instance, lreland lagged in the European transition. These countries are nearing replacement levels of fertility. The grouping together of Northern and Southern Africa is not consistent with most studies that separate sub–Saharan Africa especially Southern Africa and North Africa in terms of fertility decline (Caldwell and Caldwell, 2002; Dyson, 2013; Harper, 2016; Tabutin, Schoumaker and Rabenoro, 2004). Moreover, it is surprising that Southern Africa has embarked on a continued trajectory of fertility decline despite high mortality caused by HIV/AIDS. Evidence shows that the effect of high HIV/AIDS on decreasing or increasing fertility is inconclusive. Nonetheless, this shows that there are many other factors operating in fertility decline in the countries affected by HIV/AIDS. Moreover, Botswana and South Africa are the only two countries to have legalised abortion in Southern Africa.

6. Conclusion

Given that the majority of African countries were classified as having high or medium fertility, this study recommends that countries should invest more in the determinants of fertility decline. Infant and child mortality, access to family planning, women empowerment and general socio-economic development should be prioritised. Therefore, countries within a fertility cluster can share knowledge and experiences to meet the human development needs of the population. However further research is needed to look at intra-country and gender differentials of fertility and their programming and policy implications

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From Apartheid to Democracy: Patterns and Trends of inequality in South Africa

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Abstract

This article analyses the Gini coefficient and its alternative, the Palma index, to unpack patterns and trends of inequality in South Africa. This study is based on a continuous series of secondary data sourced from the United Nations University Wider from 1960 to 2015. Data was only available on an annual basis for this period. No new primary data was collected for this study. Exploratory graphs were used to understand the behavioural patterns in the trends of the indices. The overall simple linear regression was fitted for the Gini coefficient and was found to be significant. However, there was a notable change in the Gini coefficient trend after 1988, calling for segmented regression with 1988 as the break-point. The results show that for the entire period from 1960 to 2015, the Gini coefficient for South Africa has been significantly increasing on average by 0.35 units per year ($p<0.001$). However, pre-1988, the Gini coefficient was declining at 0.39 units ($p=0.012$) per year, the period during which it averaged 50.1±4.56. Post-1988, the Gini coefficient increased to an average of 63.7±4.65, the period during which there was no statistically significant change per year despite the upward direction of 0.27 units. The study also shows that the poor share, as a proportion of the rich share, in the gross national income is declining over time. The article suggests that policy action needs to be taken to tackle the increasing Gini coefficient involving redistributive measures in the interest of justice and fairness. Inequalities take various forms, and reinforce each other as they all matter.

***Keywords**: poverty, inequality, income, Gini coefficient, Palma index*

1. Introduction

South Africa became a democracy following the fall of apartheid in 1994; however, it left vast inequalities across racial groups. This has made South Africa one of the most unequal countries in the world to date. As such, poverty alleviation and inequality reduction became the linchpin underlying the democratic foundation of the country (Hundenborn, Leibbrandt and Woolard, 2016). During apartheid, South Africa promoted discrimination of most of the country's population, making opportunities only available to a minority group (Hundenborn et al., 2016). The reversal of privilege comes with economic, social, political, and psychological costs, affecting Black and White citizens alike. In such a context, redress and attempts at equalization are not far-fetched concerning the means of production, assets, land, and opportunity as a situation of injustice and unfairness is unattainable in the long-run as it creates societal dissonance. David et al. (2018a) believes that higher inequality has the potential to adversely affect social cohesion because it reduces inclusiveness.

Inequality invokes notions of (un)fairness and (in)justice. This panoply of (un)fairness and (in)justice is evident in contexts of high poverty rates and widening inequality, as they reinforce each other. Within the context of the Agenda 2030 for Sustainable Development, the United Nations family's ambition is to eradicate poverty by 2030 (Sustainable Development Goal 1) and reduce inequality within and among countries (Sustainable Development Goal 10) (United Nations, 2015). South Africa is a signatory to the declaration. In 1998, former President Thabo Mbeki described South Africa as a country divided into two nations due to its inequalities - one for the Whites and the other

belonging to Blacks (Gelb, 2003). South Africa's inequality during apartheid was not just political but economic in terms of income and wealth. In 1993, 10% of the poorest of the poor received 1.1 % of the national income, whereas 10% of the richest received 45% (Hoogeveen and Özler, 2006). The poorest were the Black majority and the richest were the minority White population. There is a disproportionate share of national consumption between the poorest and richest. For example, the richest 20% of the population accounted for over 61% of consumption in 2011; the bottom 20% saw their share constantly remaining below 4.5% (Statistics South Africa, 2014). Wittenberg (2018) observes that with a Pareto coefficient of 1.8, the top tail of the earnings distribution is heavy-tailed and thickening, suggesting that there are many very rich South Africans which may give rise to the view that the rich are amassing wealth and the 'new' South Africa is failing the majority of the people.

Policies implemented during apartheid favoured and benefited Whites. For instance, labour market policies aimed to preserve White privilege through the job reservations policy. During apartheid, resources such as access to land, capital, and mining rights were unequally distributed, relegating Blacks to menial and poorly paid jobs in the economy, if granted access at all (Woolard, 2002). As a result, society became highly unequal, which has been difficult to reverse (Donohue and Bornman, 2014; Graven, 2014). Black people faced relentless domination and political exclusion punctuated by unequal access to resources affecting their potential to accumulate assets and obtain returns from those assets such that inequality was deepened by rapid economic growth after the discoveries of minerals (Gelb,

2003). Due to its racial defaults, South Africa's inequalities are different compared to other African countries (Gumede, 2008).

Based on the National Income Dynamics Study (NIDS) conducted by the Southern Africa Labour and Development Research Unit (2017) about 47% of South Africans lived below the poverty line, while 56% of Blacks lived in poverty compared to 2% of Whites. According to the World Bank (2018), 10.4 million South Africans live in poverty, and the poverty rate and gap were 18.9% and 6.2%, respectively. The World Bank (2018) maintains that poverty has declined in South Africa, but inequality is increasing. McKay (2002) argues that inequality matters for poverty because an increase in income inequality, land ownership, and education implies higher levels of deprivation in these dimensions. Inequality matters for growth because countries with high levels of asset inequality record lower economic growth rates. Additionally, inequality matters in its own right because ethically there is a need for a reasonable degree of equality although there is disagreement about equality that should be prioritised: equality of outcomes or equality of opportunities? Furthermore, inequality matters because it is an important driver of social unrest, crime, and violent conflict. Therefore, this article aims to unpack the patterns and trends of inequality in South Africa in order to understand the direction they are taking and its implications.

2. Literature Review

2.1. Inequality in Africa

In Africa, inequality is deeply entrenched in the continent's history spanning as far back as 1619 when slavery started. Moyo (2014) notes that income inequality in Africa is more noticeable in urban than rural areas, but this is not applicable to former settler-colonial states where huge landholdings and related inequalities in access to assets were very high. A case in point is the income differentials between former bantustans and commercial areas of South Africa (Moyo, 2014). This implies that Africa's inequalities have their roots in colonialism, which led to the (mis)appropriation of land and other economic assets to benefit a few. Leibbrandt et al. (2010) argue that in most parts of Africa, segregation of public resource allocation by race – a 'geography of apartheid' created extreme wealth and privileges for those who had access to minerals like diamond, gold, and oil in Botswana, South Africa, and Angola. These mineral resources created enclaves where dualistic economic processes focused their wealth in limited areas and created a segregated middle-class, which resulted in ethno-regionally defined political conflict in countries such as Mozambique and Angola (Moyo, 2014). Inequalities have the potential to breed conflict should they persist. However, there are many other factors that drive these inequalities.

Asongu (2018 cited in Asongu and Odhiamba, 2019) showed that political stability and financial stability reduce inequality, but Africa's remittances increase inequality. This means that when money is remitted back to African countries, it widens the income inequality gap

between those who receive and those who do not. Africa is not only faced with income inequality alone, but gender inequality is rife, especially in sub-Saharan Africa. Ombati and Ombati (2012) argue that gender inequality in education exists in about 42 countries in sub-Saharan Africa. Hence, the continent is not deriving benefits from females who can help reduce poverty, fight disease, stop violence and political instability despite having recorded an impressive increase in total primary enrolment of 100%. Sub-Saharan accounts for 47% of the out-of-school population in the world with 54% being girls (UNESCO, 2009 cited in Ombati and Ombati, 2012). Even the average primary school completion rates for boys and girls are different - for boys, it is 56%, while for girls, it is 46% because of negative cultural practices that promote early marriage and female genital mutilation. Africa also has the lowest communication technology penetration in the world, which means that there is a huge technological inequality gap compared with other continents (Asongu and Odhiamba, 2019). This has dire consequences as it may contribute to the continent's inability to reduce poverty and inequality.

2.2. Inequality in Southern Africa

Economic growth has been rising in many African countries because of improvement in resource investment and commodity prices. Ncube, Shimeles, and Verdier–Choucichane (2012) state that high levels of inequality in Southern Africa relate to income. The root cause of income inequalities is closely associated with Southern Africa's history of racial discrimination and land dispossession associated with discriminatory socio-economic policies (Moyo, 2014). A colonial past of land and asset dispossession by conquest and racial discrimination

are at the root of the current challenges of poverty and inequality. Undoing years of plunder and dispossession require new practices of redistribution of land and economic assets for socio-economic equalization, which tries to maintain a balance between mollifying the advantaged, and appeasing and assuaging the disadvantaged lest the latter revolt.

The World Bank (2013) observed that personal income inequality in Southern Africa, especially in South Africa, Namibia, and Botswana, grew between 1989 and 2005 despite moderate to high economic growth. The income gap between the top and the bottom is 10% and 40%, respectively, showing that growth and the increase in gross domestic product (GDP) per capita are not equally shared in Southern Africa. To further unmask income inequality in Southern Africa, per capita income growth figures reveal the unequal distribution of income in South Africa and Namibia by having the highest Gini coefficient of income inequality between 0.68-0.70 and 0.70 respectively (Moyo, 2014). In these two countries, income inequality is racially and spatially structured, with Whites earning more than Blacks.

Leibbrandt et al. (2010) posit that inequality with respect to employment opportunities in Southern Africa is visible; for example, more Black South Africans are found in the informal sector due to high unemployment compared to other races. This has resulted in many Black South Africans earning lower wages in the informal sector of about US$203 per month against an average wage of about US$715 per month for the formal sector, making unemployment a key source of income inequality (Leibbrandt et al., 2010). Most of these effects

are attributed to apartheid, which restricted Black South Africans to be self-employed through racial segregation of settlements and business centres. This means that Blacks were only zoned to operate in townships and low-income rural designated Bantu areas. Thus, resulting in Black entrepreneurs struggling to access better and lucrative opportunities in economic sectors that matter. These exclusionary policies meant that Blacks were relegated to run spaza shops while Whites ran the mines, farms, banks, tourism, and marine industries.

Leibbrandt, Wegner and Finn (2011) observe that while poverty is decreasing and shows the same racial distribution as under apartheid, inequality is increasing in South Africa but with a changed composition than during apartheid. They also observe that social grants have not managed to reverse inequality trends and give all South Africans equal opportunities.

In Zimbabwe and Swaziland, income inequality levels were also higher, especially during the period 1990 and 2003, but Zimbabwe's income inequality later fell because of the sharp economic decline (Moyo, 2014). The economic decline also saw a loss in commercial agricultural production when White farmers lost production due to land reforms, and economic decline also caused a fall in middle-level jobs levelling inequality (Moyo, 2014). This fall in inequality was ignited by the emergence of small and medium-sized farmers following the land reform programme, which created a wide base of the enterprise, especially among those producing cash crops and tobacco. In contrast, drastic changes in Zimbabwe occasioned by the land reform programme saw income inequality rising from 2003 onwards. This

occurred as agricultural production started booming due to increased cash crops coming to the market, a rise in capital-intensive mining and an increase in copper prices widening inequality (United Nations Development Programme, 2012). Land ownership patterns have shifted in most Southern African countries since the attainment of independence because of decolonisation of the 1960s and in Zimbabwe due to the agriculture land reform programme (Moyo, 2008 cited in Moyo, 2014). Unequal ownership of land during the colonial rule increased the value of land (capital) for the minority while enabling land degradation in overcrowded areas occupied by Blacks. This inevitably had to change for equity, equality, social justice, and social cohesion in these countries as an imperative. With respect to Namibia, Jauch et al. (2009) argue that the country's history is marked by inequality because, at independence, about two-thirds of Blacks were living in absolute poverty due to systematic labour exploitation. This meant that Black people were not allowed to progress to higher levels within the labour markets, were confined to menial wages, and were excluded from influential positions such as managerial and professional jobs. Jauch et al. (2009) notes that women were unemployed and largely economically inactive. This means that these women depended on other people, mostly their male counterparts, for livelihoods.

2.3. Trends in inequality in South Africa since democracy

Statistics South Africa (2014) observes that labour market incomes significantly contribute to inequality in South Africa as they account for about 90% of the overall Gini coefficient between 2006 and 2015. Labour market factors such as skills are growing in importance as

predictors of poverty and inequality while the role of race and gender, though still important, are diminishing (Statistic South Africa, 2014).

Leibbrandt, Wegner, and Finn (2011) opine that inequality levels have increased, but the face of inequality has changed with present-day inequality displaying a lessened racial composition than that under apartheid. They observed that inequality has surged since democracy such that efforts to deal with it are intricate and politically controversial in situations where policies have not been unsuccessful in reversing inequality and providing equal opportunity to all South Africans (Leibbrandt et al., 2011). The granting of equal opportunity is both inevitable and necessary in the interest of social justice and fairness. One of the measures instituted by the government to alleviate poverty and reduce inequality was social grants.

The Constitution of South Africa has special provisions that safeguard social protection for its citizens. Chapter 2, section 27(1) of the Constitution says that every citizen has a right to basic services such as water, food, and health care. Hundenborn et al. (2016) opine that while households benefit from government grants, it is labour income and investment income that contribute to overall inequality. Therefore, income derived from the labour market is a significant factor in driving inequality in South Africa (Hundenborn et al., 2016). Social grants are often stopgap measures requiring other means which ensure a more equitable distribution of income and assets. However, there is evidence to show that income disparities in both the private and public sectors have become key contributors to inequality. To address poverty and inequality challenges, the government formulated the National Development Plan (NDP) Vision 2030. The

NDP (2011) aims to eliminate poverty and reduce inequality by 2030 through growing the economy, building state capacity and capabilities, and providing leadership to solve complex problems. The introduction of the 'social wage', free primary health care, social protection, no fee-paying schools, and the Rural Development Programme (RDP) housing and provision of basic services (electricity, piped water, and flush toilet) are meant to reduce poverty (Statistics South Africa, 2017). In terms of the NDP (2011), the government seeks to eliminate income poverty by decreasing the percentage of people earning an income below R419 per month (in 2009 prices) from 39% to zero; and reducing the Gini coefficient from 0.69 to 0.6 by 2030.

According to Statistics South Africa (2017), the Gini coefficient per capita income was 0.68, and the Gini coefficient based on expenditure was 0.64 (Statistics South Africa, 2017). The higher the Gini coefficient, the more unequal the nation's income is distributed. According to Bhorat and Van der Westhuizen (2010), income inequality is the key driving force behind overall inequality in South Africa. South Africa's dual economy is characterised by a small highly-skilled and highly-productive economy juxtaposed with a large low-skilled but low-productive one (Statistics South Africa, 2014). An increase of the Gini coefficient from 59.3% at the birth of democracy to 68% in 2015 is a concern to the government and citizens. A change in approach is needed to eliminate poverty and reduce inequality through empowering citizens to be responsible for their development through participation and empowerment (NDP, 2011). Complicating the issue of how to address inequality, Mantzaris (2016) observe that the scourge of corruption has been deterring investment, lowering employment, negatively affecting the exchange rate, introducing a

bias in the allocation of talent and resources, and reducing the growth of the GDP as it results in a waste of money and opportunities (resource misallocation) making inequality entrenched in the country.

3. Methodology

This article uses two inequality measures for its analysis: The Gini coefficient and the Palma index because these are the most commonly used measures of inequality, and the available data was based on these two measures. The other inequality measures are the Lorenz Curve, decile ratios, and Theil Index, which are not part of this analysis because of the absence of data based on them. In qualitative studies using participatory methods, wealth rankings, and similar techniques are used to understand local-level inequalities, limiting comparability between communities because they are context-specific. Gini coefficient assumes values between zero and one, where zero represents perfect equality (where all people have equal incomes) and one (or 100%) representing total inequality in which one person has all the income. In other words, the closer to zero the Gini coefficient is, the more equal society is, and the closer it is to one, the more unequal society is. Countries with Gini values above 0.5 are considered very unequal; for example, Botswana, South Africa, and Zambia fall in this group, while a Gini value below 0.3 is considered low and is characteristic of Scandinavian countries, including the Czech Republic, Slovenia, and Slovakia (Trapeznikova, 2019). An alternative to the Gini coefficient is the Palma index. The Palma index focuses on the tails of inequality as a response to extreme inequality. The Palma index focuses on the differences between those in the top and bottom income brackets. The ratio takes the richest 10% of the population's

share of the gross national income (GNI) and divides it by the poorest 40% of the population's share (Cobham and Sumner, 2013).

Twenty-two (n = 22) records of the Gini coefficient were obtained from 1960 to 2015 from United Nations University, World Institute for Development Economics Research (UNU-WIDER). Data points for the Palma index (n = 12) were also gathered for the same period, with records available mostly from 1993 to 2015 from the same source. Although a generalized added model (GAM) would have been ideal for providing the true nature of the data patterns, the sample size was fairly small. The GAM is a powerful data-driven technique that relies on the visual display of smooth response curve to discover patterns that cannot easily be imagined (Tinarwo et al., 2020). The interpretation of the response curve "is not based on the original values but rather a transformed scale that provides a good prediction in exploring the functional nature of the response behaviour. The vertical axis of the smoothed response curve is centred around zero, the mean centred values of the original response values" (Clark, 2014: 22). The scaled values can either be positive or negative, in which case the smoothed values will then indicate that the original response value was above and below the average response value, respectively. Nevertheless, the GAM was applied as an exploratory technique together with a line graph. Over time, the Gini coefficient pattern showed to be segmented with a single break-point that attracted the application of piece-wise regression.

The break-point of the segments was also easily noticeable, with no other statistical technique required for its determination. A break-point or turning point is usually a cut-off point for classification

purposes (Muggeo, 2003) or locations where the effect on the response changes abruptly (Robbins et al., 2006). Simple linear regression equations, $y = \beta_0 + \beta_1 x + \varepsilon$ were fitted to both segments, where β_0 represents the intercept, β_1 is the slope of the regression line and ε being the random error to be minimized. The correlation coefficient was also reported. Although the segmented regression could precisely display the patterns of the Gini coefficient, an underlying overall linear trend was also noticeable and fitted to assess its significance. A considerable amount of data points were not available for the Palma indices and the statistical analysis resorted to descriptive statistics only. All the statistical data analysis was performed in R Statistical Computing Software of the R Core Team, 2020, version 3.6.3. The statistical tests were conducted at a 5% significance level.

4. Results

Figure 1 shows the line graph of the Gini coefficient from 1960 to 2015. There was a noticeable downward trajectory in the Gini coefficient from 1960 to 1988, where the coefficient plummeted from 58 to 45. Post-1988, there was a sudden jack in the coefficients to above 54.5.

An attempt to smoothen the trend (Figure 2) showed that the post-1988 segment was linearly defined with an upward trend. However, the first segment seemed to have been misrepresented. The data points in Figure 1 suggested otherwise.

Figure 1: Line graph of Gini coefficient

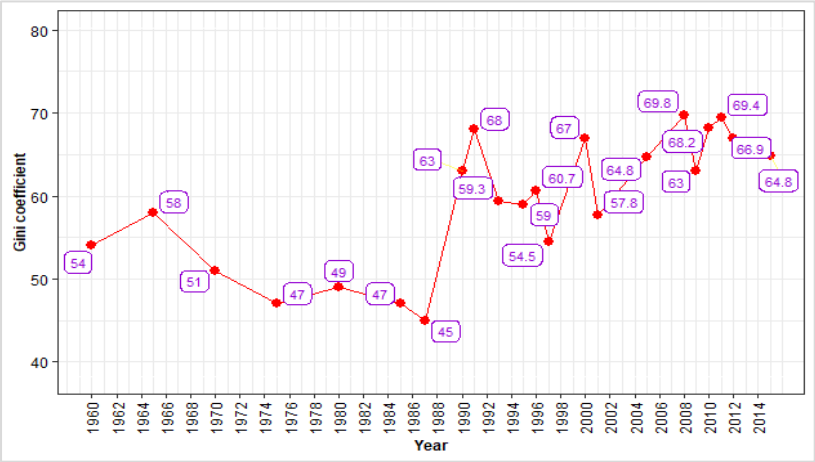
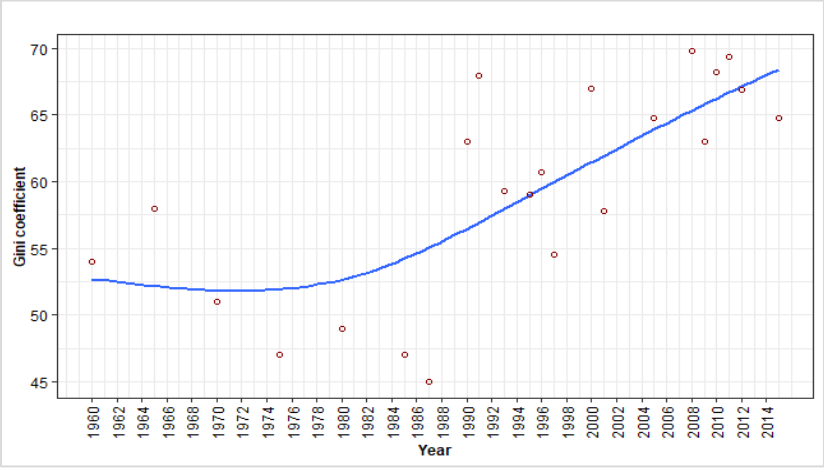


Figure 2: Exploratory GAM



It was then necessary to model the segments separately (Figure 3). The results showed that time (year) and the Gini coefficient were negatively correlated (r = -0.86, p=0.012), where r is the correlation coefficient that measures the strength of the association between the two numeric variables. From 1960 to 1988, the Gini coefficient was dropping at a rate of 0.39 each year. Post-1988, time and the Gini coefficient were moderately and positively correlated, r=0.49. Although the results showed an upward trend with an increase of 0.27 in the Gini coefficient for a unit increase in time (year), this was proven not statistically significant (p = 0.064).

Figure 3: Segmented/Piecewise regression

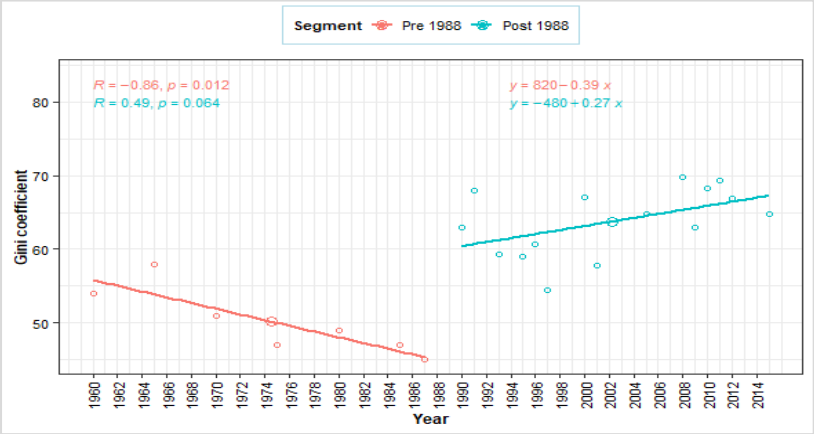


Table 1 shows the summary statistics of the Gini coefficients in both segments as well as overall. As shown also in Figure 3, there is a statistically significant difference (p<0.001) in the average Gini coefficients between the pre and post 1988 segments with the post

1988 having recorded the higher coefficients of a mean and standard deviation (mean±SD) of 63.7±4.65 and the pre 50.1±4.56. Half of the Gini coefficients that were reported pre-1988 were at least 49.0(47.0-52.5) whilst those post 1988 were at least 64.8(60.0-67.5). Overall, for the period under investigation (1960 - 2015), the mean and standard deviation (mean±SD) for the Gini coefficient was 59.3±7.9 with a 13.3% coefficient of variation around the mean. Half of the gathered Gini coefficients were at least 60.0 with the lowest 25% and highest 25% of the Gini coefficients being less than 54.1 and above 66.4 respectively. The smallest ever reported Gini coefficient in this study period was 45.0 with a maximum of 69.8.

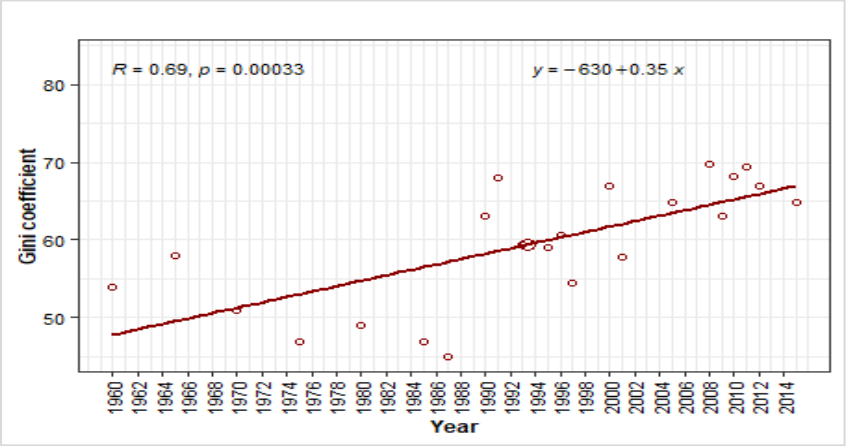
Table 1: Summary statistics of the Gini coefficients

Gini coefficient	Pre 1988 (N=7)	Post 1988 (N=15)	p-value	Overall (N=22)
Mean±SD (CV%)	50.1±4.56(9.1)	63.7±4.65(7.3)	<0.001	59.4±7.90(13.3)
Median (Q1-Q3)	49.0(47.0-52.5)	64.8(60.0-67.5)		60.0(54.1-66.4)
Min-Max	45.0-58.0	54.5-69.8		45.0-69.8

The p-values are based on non-missing cases only. CV - Coefficient of variation

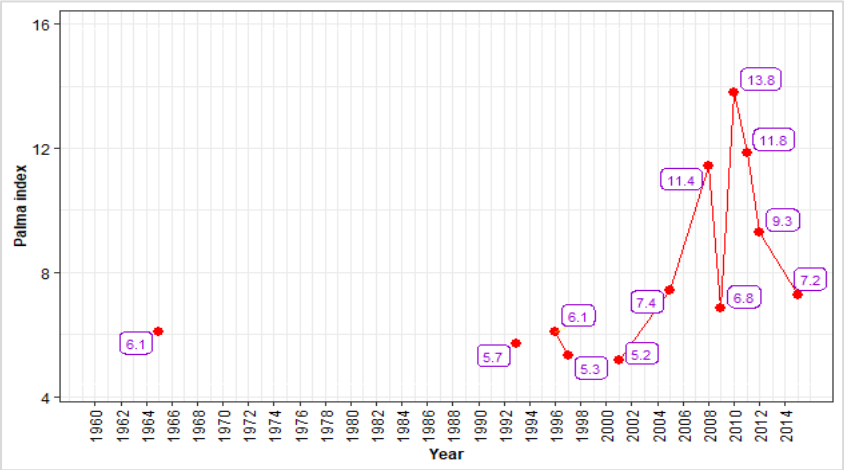
A closer inspection of Figure 1 shows the existence of a general upward trend and upon fitting the overall trend (Figure 4), the results showed a statistically significant overall strong positive correlation of r = 0.69. It can be reported that from 1960 to 2015 there has been a significant increase in the Gini coefficient at a rate of 0.35 each year.

Figure 4: The overall trend of the Gini coefficient



The Palma indices were found to be very unpredictable from the trend in the given study period (Figure 5). Ideally, the high fluctuations depicted in the Palma indices require some smoothing technique such as that employed in the GAM where wildly spread points from the line of best fit are penalised (Wood, 2000), that is, not considered, to provide the true nature of the trend underlying the response curve. However, the GAM technique is data-driven and the Palma indices are just not enough to build a stable model. However, prior to 2005, the indices were generally low. The recent figures (2010 - 2015) are suggesting that the Palma indices are plunging down.

Figure 5: Line graph of Palma indices



Of the available 12 Palma indices, 5.18 was the smallest and 13.8 being the highest reported with a mean±SD of 8.02±2.90 (Table 2). The fluctuation of the Palma indices was moderately high with a 36.1% coefficient of variation around the mean. Half of the collected Palma indices were at least 7.05 with the bottom 25% below 5.98 and the top 25% being at least 9.85. There was just a single record of Palma index of 6.1 available prior to 1988.

Table 2: Summary statistics of the Palma indices

Palma index	Pre 1988 (N=1)	Post 1988 (N=11)	Overall (N=12)
Mean±SD(CV%)	6.1	8.20±2.97(36.2)	8.02±2.90(36.1)
Median(Q1-Q3)		7.25(5.88-10.4)	7.05(5.98-9.85)
Min-Max		5.18-13.8	5.18-13.8

Both the Gini coefficient's weak correlation in the last segment and the erratic Palma index measurements could not provide enough basis for predictive purposes. However, the recent records of both attributes are indicative of an upward trend (Gini coefficient) and downward trend (Palma index).

5. Discussion

Trends in the Gini coefficient from 1960 to 2015 showed two segments, a downward trend from 1960 to 1988 and a marked increase after 1988 indicative of an unabatingly upward trend signalling the opposite of Sustainable Development Goal number 10, namely, to reduce inequality within and among countries. This heralds that South Africa, which is a signatory to the declaration, may not meet its goal of reducing inequality. This implies that the persistence of a state of a country divided into two nations resulting from its inequalities will remain, if not worsen, if no deliberate policy action is taken to reverse this trend. This is borne by the data which reveal a general upward trend during the period 1960 to 2015 at a rate of 0.35 each year with a statistically significant (p = 0.00033) and an overall

strong positive correlation (r = 0.69). Using subjective measures, David et al. (2018a) observe that about 70% of South Africans are of the view that the inequality gap between the rich and poor is worsening over time such that individuals may not readily participate in inter-racial socializations, while those who think the gap is shrinking are more likely to engage in inter-racial socializations. This implies that inequality, even perceived, can be divisive with the potential to cause social unrest in line with McKay (2002) who argues that inequality matters as a driver of social unrest, crime, and violent conflict. Statistics South Africa (2014) notes that the full potential of the labour markets have to be unlocked and the promotion of inclusive growth through skills creation hold the promise to reduce poverty and inequality. It also argues that interventions that simultaneously stimulate growth and reduce inequalities are likely to have much more impact than interventions that only stimulate growth or only reduce inequalities. The fact that the Gini coefficient showed an upward trend while the Palma Index showed a downward trend, buttressing the idea that disparities between the rich and poor are growing. Of the available 12 Palma indices, 5.18 was the smallest and 13.8 being the highest reported with a mean±SD of 8.02±2.90. The Palma index is showing that the share of GNI of the poorest is shrinking over time. In other words, the poor are not benefiting as their share is proportionately dwindling over time, while the Gini indicates that society is becoming more unequal over time. Hundenborn, Leibbrandt and Woolard (2016: 18) concluded that labour income is a "major contributor to overall inequality".

David et al. (2018b) found out that areas that were historically disadvantaged in terms of low welfare and economic outcomes are

still experiencing significant levels of deprivation as they observe a strong positive correlation between municipal poverty levels and local inequality levels, suggesting that municipalities experiencing higher levels of inequality also experience higher poverty levels. They are referring to former homeland areas under apartheid as experiencing higher levels of poverty and deprivation. The spatial patterns of poverty and inequality require new measures for significant disruptions to occur as past patterns are still dominant, especially with respect to the racial character of poverty. Policy focus should be placed on both poverty and inequality than has been the case.

For policy and practice, this implies that inequality, like poverty, does matter and has to be addressed, especially at the time of the outbreak of the COVID-19 pandemic, in which many people lost their jobs and companies closed shop. A weak economic outlook for the country where growth has been sluggish compounds the problem. Besides income inequality, other inequalities include health, education, sanitation, and housing, implying that interventions have to be multipronged, multi-faceted, and multi-dimensional as the challenge of inequality itself. This also involves land and mining rights and unlocking them in order to open new opportunities and economic vista for all. Asongu (2018 cited in Asongu and Odhiamba, 2019) argue that political stability and financial stability are important in reducing inequality; it can be surmised that their absence will exacerbate the situation. For Leibbrandt, Wegner and Finn (2011), tertiary education is a predictor of income whose importance has increased considerably such that persons with incomplete or low secondary education were worse off in 2008 compared to 1993. They also show that students' academic achievements reflect high inequality, and increased

spending in education has brought neither equality nor quality in education provisioning. Labour market policies that encourage job creation and education policies that encourage quality show promise in addressing inequality in its multi-dimensions. It is also important for the government and its social partners to collectively unpack those dimensions relevant to South Africa at this point in its development to address inequality. Of interest in that regard would be, for example, matters related to social mobility and asset redistribution.

The issue of trust is important in understanding inequality. Meiring, Kannemeyer and Potgieter (2018) view trust as central to social cohesion, thus, if generalised trust is taken as a proxy for the glue that holds a society together, then this indicates that the primary causal direction runs from equality to social cohesion. Differences in living standards serve as markers for status differences, as people generally befriend others in more or less the same income bracket and neighbourhood while having much less to do with people who are much richer or poorer than them. As there is less interaction among the various groupings, trust among them tends to be lower, and greater inequalities create greater social distances within which distrust and prejudice are more likely to take root. Subsequently, inequality as unfairness becomes a problem when poor and excluded groups do not believe in the fairness of the political, social and/or economic systems governing them (Meiring et al., 2018).

It is important to build trust between all sectors of the economy - between the government and its social partners and government and its citizens in a social compact that embraces the need to tackle inequality for the common good, fairness, and justice. Some of the

limitations of this study are firstly that the Gini coefficient is not decomposable within groups to be able to see each group's contribution to total inequality (McKay, 2002); and secondly, using regression analysis assumes linear relations while using only time as the independent variable does not mean there are no other factors that influence inequality, the response variable. In concluding, we note that an area for further research would be to understand the lived experiences of inequality from both the richest and poorest (and all those in between) through undertaking a qualitative study on experiences and perceptions of inequality using South Africa as a case study.

6. Conclusion

This study looked at inequality using the Gini coefficient and the Palma index to unpack the patterns and trends of inequality in South Africa. A segmented regression analysis was performed on the Gini data points, and an underlying overall upward linear trend was observed from 1988. Based on the Palma index, the poor's share in GNI as a proportion of the rich's share was declining. The study suggests that proactive measures need to be taken to rein in inequality before it is intractable. The overall conclusion arrived at is inequality matters.

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