MAN, ENVIRONMENT AND SOCIETY
Vol. 4, No. 1, 2023, pp. 61-79, ISSN: 2582-7669

URL : www.arfjournals.com/mes
https://DOI:10.47509/MES.2022.v04i1.04

Fertility Transition among Black South African Women: Do Contextual Influences Matter?

Ahuejere Leonard
Population Research and Training Unit, North-West University (Mafikeng Campus).
E-mail: Leonarda@statassa.gov.za

Received : 12 March 2023 • **Revised :** 20 April 2023;
Accepted : 26 April 2023 • **Published :** 29 June 2023

Abstract: In South Africa, fertility transition is a continuum and their contextual determinants are concerns to the government and other stakeholders. The South African Demographic Health Survey (SADHS) 2016 data was used to examine the role of three classifications of variables (individual, household and community characteristics) in determining fertility transition among Black South African women of childbearing age. Based on the Social-ecological (SEM) and Easterlin's micro-economic theories, analysis was carried out at the bivariate and multivariate levels. These were performed using the Chi-squared test and the Poison logistic regression model to obtain associations, respectively. The study revealed that close to half (48.1%) of these women had low fertility levels (1-2 children). Those in rural areas had higher fertility levels compared to those in urban areas in most cases. Factors such as the mother's age, employment and wealth status, owning a house with water and electricity, access and distance to health facilities (Gynaecologist/health workers), etc., were strongly associated (significant) at different model classifications ($p<0.05$). As such, it underscored the significance of these factors in explaining fertility transitions among the study populations in South Africa. It also highlights the importance of looking beyond the influence of individual-level factors only in the enquiries of associated factors of fertility transition, especially among the study sample. Overall, the study concludes that contextual factors matter. Therefore, recommended that these findings be considered in all programme and policy developments around the issue in South Africa.

Keywords: Fertility transition, Poison regression, Association, Contextual factors, household, Community, Black South African, Cross-sectional.

Background

Studies around fertility dynamics (trends and patterns) in South Africa (e.g. Anderson, 2003; Bongaarts and Casterline, 2013; Moultrie and Timaeus, 2002; Palamuleni *et*

TO CITE THIS ARTICLE

Leonard, A. (2023). Fertility Transition among Black South African Women: Do Contextual Influences Matter?, *Man, Environment and Societys,* 4(1), pp. 61-79. *DOI:10.47509 /MES.2023.v04i1.04*

al., 2007; Rampagane, 2016) suggest that fertility levels are on the decline. Results indicate that the rate fell from 6.0 children in the 1950s to 3.3 children in the 1990s. The rate declined further to 2.6 children in 2011 and 2.4 children in 2016, suggesting a 0.2 decrease compared to the last three years' average in the country (Stats SA, 2016). Compared to other countries in sub-Saharan Africa, these levels and marginal declines were said to be below average and unacceptable. These are so, given the human and material resources invested in promoting family planning and other fertility-related issues.

In addition, earlier results in the country point to variations in the fertility decline by demographics over the years, as fertility levels began to decline at different times and rates among different population groups in South Africa. Specifically, the rate declined more slowly for the Black African population when compared to any other population group in the country (Magagula, 2009; Swartz, 2003). For example, the fertility level of the Black African population group was at 3.0 children per woman in the 1980s, declining from 6.5 children per woman in the 1960s (ibid). The rate was at 2.8 in 2011, and during the same period, the white (1.7) and Indian/Asian (1.8) population groups had already recorded a remarkable decline in fertility below replacement levels (Stats SA, 2015). Therefore, at the rate of 2.8 in 2011, the level of fertility among Black African women remained the highest among all population groups in South Africa (ibid), with the provincial pattern differentials reflecting the unique provincial characteristics prevailing in each province (Stats SA, 2015; Palamuleni *et al.*, 2007).

In light of the above, early studies (e.g. Palamuleni *et al.*, 2007) have revealed some broad background characteristics behind the fertility dynamics experienced in South Africa. However, much effort is still needed in exploring other contextual (distal) factors that also have a place in influencing fertility patterns (transition) in the country in recent times. In other words, the place of contextual determinants (distal factors), including the mechanism through which they exert their impacts on fertility patterns among these women in particular, has not been clearly established in order to pass a proper judgment in South Africa. These are mostly socio-structural and neighbourhood-related factors also expected to influence fertility transitions in any social context. More so, the need to explore these factors, especially among the Black South African women of childbearing age (15–49 years) in South Africa, has become inevitable and such a concern. Literature suggests that certain household, kinship and community factors that favour childbearing remain highly influential in many African countries and, as such, need to be explored (Makinwa, 2001).

Against these backdrops, this study examined the contextual (individual, household and community level) determinants of fertility transition among Black South African women of childbearing age in South Africa. This was done using the South African Demographic Survey data (SADHS) collected in the country in 2016. Understanding these dynamics will bring about informed policies and programme development. Additionally, they are crucial to the achievement of the broader Sustainable Development Goals (SDGs) in South Africa.

Methods

Data and Sample Design

The South African Demographic and Health Survey data (SADHS) 2016 was used in the study to examine the individual and contextual (socio-structural) factors determining fertility transitions among the study sample (Black South African women of childbearing age). The data was collected using methodology appropriate to the South African context. Samples for the SADHS 2016 were selected using a stratified two-stage cluster sampling design. A total of 15 292 households were sampled, with 11 083 households covered across the country, suggesting an 83% response rate (Stats SA, 2017). The study employs an analytical cross-sectional study design through the analysis of secondary datasets referred to above. The data is suitable enough to provide information to observe patterns and obtain associations.

Data Analysis and Models

Based on the Social-ecological (SEM) and Easterlin's micro-economic theories, the study adopts a quantitative analysis approach conducted at two levels. These are the bivariate and multivariate levels of analysis. These helped in revealing patterns and the relationship existing between the explanatory and outcome variables at two levels. The Chi-squared test was applied at the bivariate levels, while the Poisson regression model was applied at the multivariate level, respectively. The Poisson regression model is appropriate to use when an outcome variable of interest is a discrete count variable, i.e. with count responses which are continuous in nature. Also, the model was considered because the outcome variable of the study has a range value which is small and non-negative (Wei *et al.*, 2018). According to Pazvakawambwa (2015), the Children ever born variable (i.e. CEB) "is a discrete quantitative random variable which had a small number of counts" (Pazvakawambwa, 2015:56), and therefore fits well with the Poisson regression model.

Variable Measurements and Definitions

Outcome and Explanatory Variables

The number of Children ever born (CEB) variables were used as a measure of the outcome variables in the study. The CEB is a continuous fertility variable with 0–17 count responses, capturing the total number of children ever born to a woman. To obtain this variable, a question was asked on how many children a woman has ever given birth to (in the last twelve months). This variable was recoded into four response categories at the bivariate levels and further recoded appropriately and labelled fertility transition to fit the model at the multivariate level of the study. Selected individual and contextual (socio-structural) characteristics in the datasets were identified and used as explanatory variables in the study. Also known as individual and neighbourhood-level characteristics, these variables were appropriately defined (categorised) to fit three regression models at the multivariate level. They were carefully selected, extracted and recorded were necessary to suit the study objectives. The selection of all explanatory variables was guided by reviewed literature and established theoretical foundations of the study.

Results

Bivariate results

Figure i-ix below presents the results of the bivariate distribution of fertility levels (no child, low, moderate and high fertility transitions) by selected individual and contextual characteristics of the study sample, 2016. The overall results (Figure i) show that a proportion (48.1%) of these women have low fertility levels (1–2 children), while only 11,2% have high fertility levels (4 children plus) in South Africa. These proportions suggest that close to half of these women have low fertility levels, while a little over one in every ten has high fertility levels. The proportion of those with high fertility levels (4 children plus) increased with age, while the proportion of those with no children decreased with age. There were significant proportions of those having low fertility levels (71.5%) among those in the age group 25–29, compared to any other level in the age group. Those in the age group 15–19 (89.2%) had the highest proportion among those with no children. This proportion indicates that above two-thirds of women in this age group had no children.

The results show that the higher the levels of education, the higher the proportion of those with low fertility (1–2 children) and the lower the proportion of those with high fertility levels (4 children plus). Also, women with higher levels of education (59.9%) had the highest proportion among those with low fertility levels (1–2 children). About two in every ten (18.1%) of those with primary education had moderate fertility (3 children) among the study sample. A significant portion of those with low fertility levels (1–2 children) resided in the Northern Cape (54.2%), closely followed by Gauteng (50.7%). The North West province (23.4%) had the least among those with no children. These proportions suggest that a little above two in every ten of these women in the North West province had no children, suggesting a low proportion. The low proportional level was also consistent in all provinces in South Africa during the study period.

Furthermore, a large proportion (50.2%) of these women who stayed in urban areas had low fertility levels. This proportion suggests that half of these women with low fertility levels (1–2 children) stayed in urban areas. Although, the proportion who reside in the rural areas (14.8%) was higher than those who resided in the urban areas (9.3%) among those with high fertility levels (4 children plus). A high number of these women with low fertility (67.6%) used the health facility as their place of delivery, while an insignificant proportion (38.7%) of those with high fertility (4 children plus) used the home as their place of delivery.

Over two-thirds of those women with low fertility levels used community health workers (66.7%) during prenatal care, suggesting a high proportion. The results show

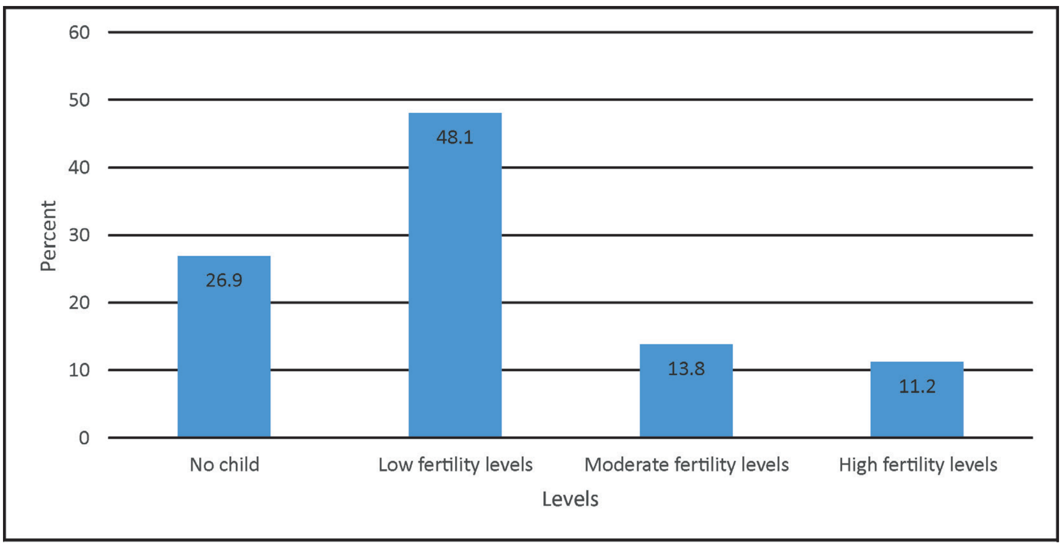
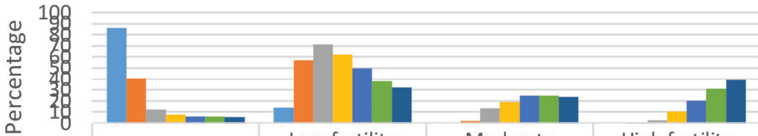


Figure i: Distribution of fertility levels among Black South African women, 2016

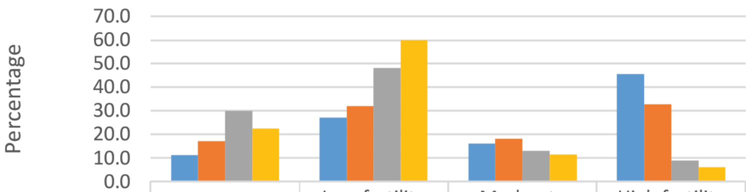
Note: No child = 0 child, low = 1-2 children, moderate = 3 children and high = 4 children plus

Figure ii: Distribution by Mother's age in group



	No child	Low fertility levels	Moderate fertility levels	High fertility levels
15-19	86.2	13.8	0.0	0.0
20-24	40.5	57.0	2.1	0.5
25-29	12.3	71.5	13.2	2.9
30-34	7.5	62.1	19.4	10.9
35-39	5.6	49.4	24.6	20.4
40-44	5.6	38.4	24.6	31.4
45-49	5.2	32.2	23.7	39.0

Figure iii: Distribution by Levels of education

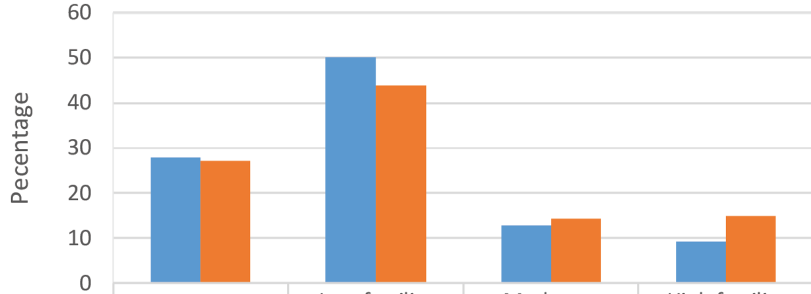


	No child	Low fertility levels	Moderate fertility levels	High fertility levels
No schooling	11.1	27.2	16.1	45.7
Primary	17.3	32.0	18.1	32.6
Secondary	29.9	48.0	13.1	9.0
Higher	22.6	59.9	11.4	6.1

Figure iv: Distribution by Province/Region

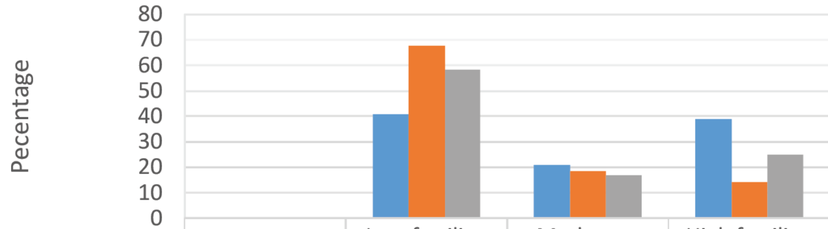
	No child	Low fertility levels	Moderate fertility levels	High fertility levels
Western Cape	30.7	47.3	14.9	7.1
Eastern Cape	27.6	45.9	13.8	13.1
Northern Cape	24.3	54.2	12.7	8.9
Free State	29.8	49.6	12.7	8.0
KwaZulu-Natal	31.1	46.1	11.9	11.0
North West	23.4	46.8	16.5	13.3
Gauteng	25.4	50.7	13.9	10.1
Mpumalanga	26.0	47.1	11.8	15.2
Limpopo	28.4	42.1	14.7	14.7

Figure v: Distribution by Type of place



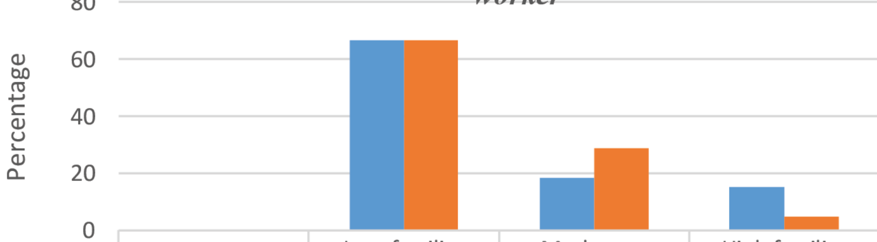
	No child	Low fertility levels	Moderate fertility levels	High fertility levels
Urban	27.8	50.2	12.8	9.26
Rural	27.2	43.8	14.2	14.8

Fogure vi: Distribution by Place of delivery



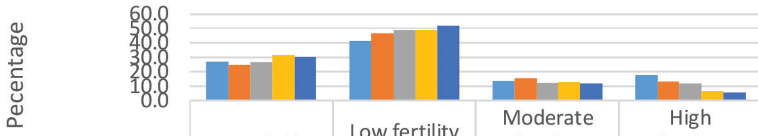
	No child	Low fertility levels	Moderate fertility levels	High fertility levels
Home	0.0	40.6	20.8	38.7
Health facility	0.0	67.6	18.4	14.0
Others	0.0	58.3	16.7	25.0

Figure vii: Distribution by access to Community health worker



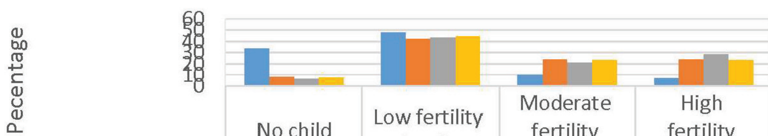
	No child	Low fertility levels	Moderate fertility levels	High fertility levels
No	0.0	66.5	18.4	15.2
Yes	0.0	66.7	28.6	4.8

Figure viii: Distribution by Wealth status



	No child	Low fertility levels	Moderate fertility levels	High fertility levels
Poorest	27.2	41.4	13.6	17.6
Poorer	24.6	46.7	15.5	13.2
Average/middle	26.6	49.1	12.4	11.9
Richer	31.5	49.1	12.8	6.6
Richest	30.1	52.0	12.0	5.9

Figure ix: Distribution by Owing house



	No child	Low fertility levels	Moderate fertility levels	High fertility levels
Does not own	34.1	48.2	10.3	7.4
Alone only	8.8	42.6	24.2	24.4
Jointly only	6.8	43.6	21.2	28.4
Both alone & jointly	8.3	44.6	23.1	24.0

Figure ii-ix: Distribution of fertility levels by selected individual and contextual characteristics among Black South African women, 2016

Note: No child = 0 child, low = 1-2 children, moderate = 3 children and high = 4 children plus

that the richest (52%) were higher among those with low fertility levels (1–2 children), while the poorest (17.6%) were higher among those with high fertility levels (4 children plus). Also, the proportion decreased as the wealth quintile increased among those with high fertility and increased among those with low fertility in the study period. The wealthier these women were, the lower their fertility levels and the poorer the women, the higher their fertility levels. Therefore, the wealth quintile was found to have a suppressing effect on fertility. However, almost half (48.2%) of these women with low fertility levels (1–2 children) did not own a house.

Overall, the results in Table i showed that with the exception of the sex of the child and prenatal care (Gynaecologist/community health worker) variables, all tested characteristics were found to be associated with fertility transitions (levels) among the study sample in the study period ($p<0.05$).

Multivariate Results

Table i presents the results of the Poisson regression model for the factors influencing fertility levels (low fertility transition) of the study sample in 2016. The results revealed that the mother's age was significant in all model tests. However, the incidence ratio power of those in the age group 35–39 was 35% lower (IRR=0.35:CI=0.26-0.45) compared to the reference category (model 1). The sex of a child was not a strong influencer of fertility transition in most of the model tests. Test of general classification (model 2) shows that those with a female child presented a 1% lower association (IRR=0.99: p<0.05) compared to those with a male child. This ratio suggests a 0.99 (CI=0.84-1.16) less associated likelihood compared to those in the reference category. With the exception of primary education levels, the result revealed that education was significantly associated, especially in the joint model test (model 1). The incidence rate ratios (IRR) of those with higher levels of education was 30% higher, suggesting a strong association, compared to those with no schooling (p<0.05) (reference category). The results also showed that as the level of education increases, the ratio value of the association also increases, indicating a direct relationship. Also, ascribing strong importance to the variable, especially at the individual and household levels.

Mother currently working was also strongly associated, therefore related at all model test levels (model 1 to 3), and as such, ascribing strong importance to the variable. The associated ratio among those currently working was 4% higher (IRR=1.04:CI=0.73-1.46) compared to those not currently working (model 2) (p<0.05). The results show that the mother's occupation was significantly associated with fertility transition in almost all models tested. Specifically, the test at models 2 and 3 presented a significant increase in the ratio of association, especially among those in formal and informal employment, and therefore reflects the strength of the variable. Test of joint categorisation (model 1) showed that those in formal employment had a 13% higher association (IRR=1.13:CI=1.00-1.29) compared to those not working (reference category).

The result also showed that the husband not being at home (staying elsewhere) was strongly associated with fertility transition in all model tests. However, tests at these levels revealed that husbands staying elsewhere showed only a 1% higher association (IRR=1.01; p<0.05) compared to those in the reference category. Owning a house presented a strong association in all other model tests. Test of at final classification model (model 3) among those jointly owning only showed a 26% higher association (IRR=1.26, p<0.05), suggesting a 1.26 times associated likelihood compared to those who do not own a house.

Also, households having electricity were strongly associated with all model tests. The results show that the associated ratio of having electricity was 36% higher (models 2 and 3) in the study period. The ratio at general classification suggests a 1.36 (CI=0.88-2.11) times higher likelihood compared to those not having electricity ($p<0.05$). The results also show that household family size was statistically significant at all model tests. However, the associated power of households with 5–6 family size was 44% lower (IRR=0.44:CI=0.38-0.51) compared to those with <5 household members ($p<0.05$) (model 1).

Except for those with no toilet facility, the results show that the type of toilet facility presented strong associations among the study sample, especially among those using pit latrines in all model tests. However, the result indicates that the associated ratio of using a pit latrine was only 4% higher (IRR=1.04:CI=0.94-1.14) at the joint model test (model 1) compared to those using a flush toilet. In addition, except for those using a river/stream, all other sources of drinking water also maintained a relatively strong association. Test of joint and general model categorisation (models 1 and 2) indicates that those using a well/borehole had 11% and 5% higher ratio, suggesting a 1.11 and 1.05 ($p<0.05$) times associated likelihood, compared to those using piped water. Furthermore, the results show that the wealth quintile (status) was statistically significant (model 1) and presented strong incidence ratios in all model tests. The results further show that the richest of these women had a 13% (IRR=1.13:CI=0.69-1.84) and 15% (IRR=1.15:CI=0.71-1.86) higher association (models 2 and 3), compared to the poorest.

Province/region of residence was found to be a weak influencer of fertility transition. The test of general and final model classification (models 2 and 3) showed that KwaZulu-Natal had 25% (IRR=0.75:CI=0.43-1.32) and 23% (IRR=0.77:CI=0.45-1.30) lower associations, compared to those staying in Western Cape. However, the results also seem to suggest that fertility transition was less likely in North West province as a more traditional province, compared to other provinces. Similarly, staying in any type of place of residence presented weak associations in all model tests. However, those residing in rural areas had about 8% and 9% less associated likelihoods (models 2 and 3) compared to those living in the urban areas, suggesting a higher chance of fertility transition in the urban areas. Accessing a Gynaecologist presented a strongly associated power of 8% at the general model test (IRR=1.08:CI= 0.84-1.41) (model 2), signifying a strong factor to fertility transition. Access to a prenatal community health worker also presented consistently strong patterns. Black South African women of childbearing age with access to a community health worker presented a 53% higher

Table i: Results of Poisson regression model for the general factors influencing fertility levels (low fertility transition) of the study sample, 2016

Variable	*Chi-squared test*	*Model 1 Joint classification regression (Ind & H/hld combined)*		*Model 2 General classification regression (Ind, H/hld & Comm combined)*		*Model 3 Final classification regression (Factors significant at bivariate levels only)*	
	P>|z|/ p-value	*IRR*	*(95% CI)*	*IRR*	*(95% CI)*	*IRR*	*(95% CI)*
Mother's age							
15-19		1.00		1.00		1.00	
20-24	0.000***	0.74**	0.58-0.94	0.63**	0.41-0.96	0.63**	0.41-0.96
25-29		0.52***	0.41-0.67	0.37***	0.23-0.58	0.37***	0.24-1.58
30-34		0.44***	0.34-0.57	0.30***	0.19-0.47	0.30***	0.19-0.47
35-39		0.35***	0.26-0.45	0.17***	0.10-0.29	0.17***	0.10-0.30
40-44		0.28***	0.21-0.37	0.07***	0.03-0.16	0.07***	0.03-0.16
45-49		0.23***	0.17-0.31	2.20***	7.19-6.71	2.18***	7.20-6.62
Sex of child							
Male	0.432	1.00		1.00		NA	
Female		1.03	0.96-1.10	0.99	0.84-1.16		
Mother level of edu							
No schooling	0.000***	1.00		1.00		1.00	
Primary		0.90	0.62-1.29	0.40	0.14-1.09	0.40	0.15-1.08
Secondary		1.25	0.89-1.74	0.79	0.31-2.05	0.80	0.31-2.06
Higher		1.30	0.92-1.84	0.85	0.31-2.29	0.87	0.32-2.32
Language							
English		1.00		1.00		1.00	
Afrikaans		0.92	0.60-1.41	0.88	0.25-3.17	0.94	0.27-3.23
IsiXhosa	0.000***	0.91	0.79-1.05	0.81	0.51-1.27	0.80	0.52-1.26
IsiZulu		0.83**	0.72-0.96	0.68	0.45-1.02	0.69	0.46-1.02
Sesotho		0.93	0.82-1.07	1.01	0.72-1.43	1.02	0.72-1.43
Setswana		0.92	0.81-1.06	0.90	0.53-1.54	0.90	0.53-1.54
Sepedi		0.85**	0.73-1.00	0.89	0.58-1.36	0.91	0.60-1.38
SiSwati		0.88	0.71-1.09	1.00	0.55-1.81	1.01	0.55-1.84
Tshivenda		0.76**	0.59-0.97	0.83	0.51-1.35	0.84	0.51-1.36
Xitsonga		0.94	0.80-1.10	0.93	0.61-1.41	0.94	0.62-1.41
IsiNdebele		1.13	0.94-1.36	1.63	0.92-2.88	1.65	0.94-2.91
Mother c/working							
No	0.000***	1.00		1.00		1.00	
Yes		1.03	0.90-1.18	1.04	0.73-1.46	1.03	0.73-1.46

Table i: Results of Poisson regression model for the general factors influencing fertility levels (low fertility transition) of the study sample, 2016 (continued)

Variable	*Chi-squared test*	*Model 1 Joint classification regression (Ind & H/hld combined)*		*Model 2 General classification regression (Ind, H/hld & Comm combined)*		*Model 3 Final classification regression (Factors significant at bivariate levels only)*	
	P>|z|/ p-value	*IRR*	*(95% CI)*	*IRR*	*(95% CI)*	*IRR*	*(95% CI)*
Mother Occupation							
Not working	0.000***	1.00		1.00		***1.00***	
Formal employment		1.13**	1.00-1.29	1.18	0.86-1.61	***1.17***	***0.86-1.60***
Informal employment		1.28**	1.04-1.58	2.29**	1.27-4.12	***2.33***	***1.32-4.11***
Manual		0.93	0.79-1.11	0.92	0.61-1.39	***0.90***	***0.60-1.37***
The husband resides at home	0.000***	1.00		1.00		1.00	
Living with her		1.01	0.91-1.12	1.01	0.81-1.27	1.01	0.80-1.26
Staying elsewhere							
Own house							
Does not own	0.000***	1.00		1.00		1.00	
Alone only		1.07	0.89-1.28	1.10	0.72-1.68	1.10	0.73-1.66
Jointly only		0.97	0.88-1.07	1.24	0.97-1.58	1.26	0.99-1.60
Both alone & jointly		1.01	0.91-1.12	1.03	0.81-1.31	1.02	0.80-1.30
Has electricity							
No electricity	0.000***	1.00		1.00		1.00	
Has electricity		1.01	0.83-1.24	1.36	0.88-2.11	1.36	0.88-2.11
H/family size							
<5	0.000***	1.00		1.00		1.00	
5-6		0.44***	0.38-0.51	0.63**	0.47-0.84	0.62**	0.47-0.84
7+		0.45***	0.37-0.53	0.72**	0.54-0.96	0.70**	0.53-0.95

Table i: Results of Poisson regression model for the general factors influencing fertility levels (low fertility transition) of the study sample, 2016 (continued)

Variable	*Chi-squared test*	*Model 1 Joint classification regression (Ind & H/hld factors)*		*Model 2 General classification regression (Ind, H/hld & Comm factors)*		*Model 3 Final classification regression (Factors significant at bivariate levels only)*	
	P>|z|/ p-value	*IRR*	*(95% CI)*	*IRR*	*(95% CI)*	*IRR*	*(95% CI)*
Type of toilet facility							
Flush toilet	0.000***	1.00		1.00		1.00	
Pit latrine		1.04	0.94-1.14	1.02	0.79-1.33	1.03	0.80-1.33
Other		0.99	0.78-1.25	1.04	0.69-1.57	1.05	0.70-1.58
None		1.00	0.78-1.28	0.67	0.40-1.12	0.66	0.39-1.12
Source of drinking water							
Piped	0.000***	1.00		1.00		1.00	
Well/borehole		1.11	0.93-1.31	1.05	0.73-1.50	1.06	0.75-1.51
River/stream		0.87	0.61-1.24	0.26	0.04-1.59	0.26	0.41-1.64
Other		1.05	0.90-1.22	1.25	0.94-1.66	1.26	0.94-1.67
Wealth quintile							
Poorest	0.000***	1.00		1.00		1.00	
Poorer		1.07	0.90-1.29	1.01	0.70-1.46	1.02	0.71-1.47
Average		1.22**	1.02-1.48	1.09	0.72-1.64	1.10	073-1.65
Richer		1.32***	1.08-161	1.11	0.71-1.72	1.11	0.72-1.72
Richest		1.52***	1.22-1.89	1.13	0.69-1.84	1.15	0.71-1.86
Province/region							
Western Cape	0.000***			1.00		1.00	
Eastern Cape				1.14	0.75-1.74	1.15	0.76-1.74
Northern Cape				0.85	0.45-1.63	0.86	0.44-1.64
Free State				0.85	0.52-1.39	0.85	0.53-1.37
KwaZulu-Natal				0.75	0.43-1.32	0.77	0.45-1.30
North West				0.71	0.40-1.27	0.71	0.40-1.26
Gauteng				0.94	0.61-1.43	0.92	0.61-1.39
Mpumalanga				0.86	0.54-1.37	0.85	0.54-1.33
Limpopo				0.94	0.58-1.53	0.92	0.57-1.49

Table i: Results of Poisson regression model for the general factors influencing fertility levels (low fertility transition) of the study sample, 2016 (concluded)

Variable	*Chi-squared test*	*Model 1 Joint classification regression (Ind & H/hld factors)*		*Model 2 General classification regression (Ind, H/hld & Comm factors)*		*Model 3 Final classification regression (Factors significant at bivariate levels only)*	
	P>|z|/ p-value	*IRR*	*(95% CI)*	*IRR*	*(95% CI)*	*IRR*	*(95% CI)*
Type of place of residence							
Urban area	0.000***			1.00		1.00	
Rural area				0.92	0.70-1.20	0.91	0.69-1.19
Prenatal care: Gynae	0.597						
No				1.00			
Yes				1.08	0.84-1.41	NA	
Prenatal care: Comm H/ officer	0.268			1.00			
No				1.53	0.87-2.70	NA	
Yes							
Distance from health facility	0.008**			1.00		1.00	
Big problem				0.95	0.78-1.16	0.96	0.79-1.17
Not a big problem							
Place of delivery	0.000***						
Home				1.00		1.00	
Health facility				3.04	0.92-10.01	3.05	0.91-10.13
Others				2.67	0.30-23.68	2.63	0.29-23.06
Statistical information							
No. of subjects							
No. of observations		1935		439		439	
Wald chi2		781.70		1505.74		1506.13	
No. of failures							
Time at risk							
Log-likelihood		-1504.29		-317.07		-317.28	
Prob>Chi2		0.0000		0.0000		0.0000	

Note: *** = Highly statistically Significant at $p<0.05$ (i.e. 0.05% test level or 95% CI); ** = fairly statistically Significant at $p<0.05$ (i.e. 0.05% test level or 95% CI); 1.00 = reference category.

association compared to those without access to a community health worker (model 2). Also, place of delivery was strongly associated, especially with those whose place of delivery was in a health facility, presenting the highest associated values in all model tests. The test at model 3 classification brought about an increase in the hazard ratio effect. The associated power of delivering in a health facility was 3.05 times higher (model 3) compared to those who delivered at home ($p<0.05$) (Leonard, 2021).

Discussion

The study examined fertility transitions among Black South African women of childbearing age. with a view to assessing if contextual factors matter and, therefore, are relevant to fertility transition among the study population. The results at the bivariate level revealed that close to a majority of the women in South Africa have low fertility levels, while a little above one in every ten has high fertility levels. This pattern suggests that the level of association was higher among those with low fertility levels (1–2 children) and lower among those with high fertility levels in the study period. As such, consistent with national patterns.

The test at the multivariate level found that the mother's age was statistically (highly) significant among the study sample. The association also decreases as age increases, suggesting a lesser effect on fertility transition due to age increase and consequently supporting the notion that older women of childbearing age contribute less to fertility levels. Also, "older women maintain fertility behaviour closer to natural fertility compared to younger cohorts" (Magagula 2009:29). The relationship between age and fertility levels is well documented in South Africa.

Having secondary and higher levels of education was significant and strongly associated, especially with the joint classification model test (model 1). The results also revealed that as the levels of education increased, the value of association increased, suggesting a direct relationship and stronger likelihood. Literary evidence has shown that women with a higher level of education tend to have a higher influence on their fertility, postponing childbearing and preferring a lower number of children. In support of this notion, studies such as Moultrie and Timæus (2002) and Rossouw *et al.* (2012) found improved educational levels as strongly related and, therefore, concluded that they are strong influencers of fertility.

Although mothers currently working were found to be strongly associated and therefore related at all classification model tests, the ratio of association among those currently working was only 4% higher compared to those not currently working (model 2). Empirical evidence shows that most employed women generally postpone having children in pursuit of a working career. Swartz (2003) identified women's employment as a strong influencer of fertility transition in South Africa. With the exception of those in manual occupation, the results revealed that other occupation types (formal and informal) were also strongly associated with all classification models tested. Specifically, those in formal employment presented a 13% higher association at the joint classification model test. The relationship between this factor and fertility transitions is also well documented in South Africa. Although with a low ratio, the study also found that the husband not being at home (staying elsewhere) is an influencer of low fertility transitions. More so, the inclusion of a new class of variables also resulted in changes in incidence ratio values, ascribing strong importance to the variable. Husbands staying elsewhere present a lower chance of pregnancy and therefore, lower fertility rates for women compared to those who stay with their husbands. Rossouw *et al.* (2012) identified issues around household arrangements as possible factors of fertility transition in South Africa.

The results also revealed that jointly owning a house and having electricity were strongly related in the study period. Specifically, the results revealed that the addition of new classifications resulted in an increase in ratio values among these women in South Africa. As such, they highlight the importance of these variables in influencing fertility levels among the study sample. Anderson (2003) found access to electricity a strong influencer of fertility levels among women in general in South Africa. More so, the study also revealed that having traditional toilet facilities (pit latrine and others) presented a relatively (moderately) strong association among these women. Anderson (2003) identified socio-structural (intervening) factors such as sanitation as determinants of fertility transitions. However, the study found that the wealth quintile (status) was statistically significant, with the richest having a 52% higher association (model 1). In line with expectations, the ratios also increased as the wealth increased, further ascribing strong importance to the variable. In applying the Poisson regression model, Ndahindwa *et al.* (2014) examined the determinants of fertility in Rwanda in the context of a fertility transition and found household wealth as a possible influencer of fertility transition in the country. Rossouw *et al.* (2012), in a study in South Africa, also found this factor to be consistent (Leonard, 2021).

The provinces/regions in which these women resided are not good influencers of fertility transition. However, the results also seem to suggest that fertility transition was less likely to occur in more traditional provinces of South Africa. This finding negates the findings of Mberu and Reeds (2014), who identified the region as a general influencer of fertility in an earlier study in Nigeria. Lerch and Spoorenberg (2020) associated this development with the recent onset of birth limitation in the regions. Other studies (e.g. Palamuleni *et al.*, 2007; Timæus and Moultrie, 2002) argued that these developments were a result of inconsistencies and differentials in provincial values existing in the provinces. Consistent with expectations, residing in rural areas also presented weak predictive powers in all classification models tested. However, the results revealed that fertility transition was more likely to occur in urban areas compared to rural areas. Studies such as those by Sayi (2014) and Magagula (2009) found this result to be consistent, associating it with the transitional difference in the rural and urban areas in relation to fertility transitions in Southern Africa.

Although moderate, access to a Gynaecologist presented a strong association of 8% (IRR=1.08) at the general model test (model 2). The test of access to a community health worker also presents a consistent pattern. However, the ratio of association of these women with access to a community health worker was 53% higher compared to those without access to a community health worker (model 2). These findings suggest that these women are more likely to use community health workers compared to other medical personnel during their pre-natal experience. This development may be associated with the issue of access and the high cost of medical services experienced in South Africa. In addition, the study revealed that using health facilities as a place of delivery was strongly associated with the study sample. Anderson (2003) identified socio-structural factors as a good influencer of fertility in South Africa. Overall, in examining the South African fertility decline, South (2001) argued that the effect of community structures on family-related events cannot be overemphasised.

Conclusion

The study revealed that close to half of the study sample has low fertility levels (1-2 children). Factors such as the mother's age, employment and wealth status, owning a house with water and electricity, access and distance to health workers and facilities, etc., were strongly associated (significant) at different model classifications ($p<0.05$). As such, it underscored the significance of these factors in explaining fertility transitions among the study populations in South Africa. It also highlights the importance of looking beyond the influence of individual-level factors only in the enquiries of associated factors of fertility transition, especially among Black South African women of childbearing age. Overall, the study concludes that contextual factors matter. Therefore, it is recommended that these findings be considered in all programme and policy developments around the issue in South Africa.

Ethical issues

The study used secondary data already collected, processed and available on request. Also, the study design is quantitative in nature and, as such, has no risk of undue disclosure and other ethical considerations. Consequently, ethics clearance was granted for the study by the Basic and Social Sciences Research Ethics Committee (BaSSREC) of North West University. Also, permission to use the SADHS 2016 data for this study was obtained from ICF Macro Inc. accordingly.

Competing Interests and Acknowledgements

The authors have no conflicts of interest to declare in carrying out the study. The authors will like to acknowledge the ICF Macro for their permission to access the South Africa Demographic Health Survey (2016) data used in the study.

Funding

The authors would like to extend their appreciation to Statistics South Africa (Stats SA) and the Faculty of Humanities School of Postgraduate Studies and Research of the North-West University for providing the financial support needed for the study.

References

Anderson, B. 2003. Fertility in South Africa: Current Issues and Prospects for the Future. *PSC* Research Report at the Institute of Social Research, *University of Michigan*. Report No. 03-532, Feb. 2003.

Bongaarts, J. & J. Casterline. 2013. Fertility Transition: Is Sub-Saharan Africa Different? *Population and Development Review* 38(Suppl.): 153–168. doi:10.1111/j.1728-4457.2013.00557.x.

Leonard, A. (2021). Contextual Determinants of Marital and Fertility Patterns among Black South African Women. PhD dissertation in Population Studies, *North-West University*, 2016.

Lerch, M. & T. Spoorenberg. 2020. The emergence of birth limitation is a new stage in the fertility transition in sub-Saharan Africa. *Demographic Research*: Volume 42, Article 30, Pages 827-858 Published 7 Maya, 2020 https://www.demographic-research.org/Volumes/Vol42/30/ DOI: 10.4054/DemRes.2020.42.30.

Magagula, T.K. 2009. Examining the effect of changing marriage patterns on fertility among African South African women. Master's thesis in Population Studies, *University of KwaZulu-Natal Durban*, 2009, p29.

Makinwa-Adebusoye, P. 2001. Socio-cultural factors affecting fertility in Sub-Saharan Africa. *The Nigerian Institute of Social and Economic Research (NISER*), Lagos.

Mberu, B.U. & Reed, H.E. 2014. Understanding Subgroup Fertility Differentials in Nigeria. *Population Review,* 2014; 53(2):23-46. DOI:10.1353/prv.2014.0006.

Moultrie, T.A. & I.M. Timaeus. 2002. Trends in South African fertility between 1970 and 1998: An analysis of the 1996 Census and the 1998 Demographic and Health Survey. Technical Report, *Burden of Disease Research Unit, Medical Research Council.*

Palamuleni, M.E., I. Kalule-Sabiti & M. Makiwane. 2007. Fertility and Childbearing in South Africa Families and Households in Post-Apartheid South Africa. Human Science Research Council (HSRC), *HSRC Press,* 2007.

Rampagane, K.V. 2016. Marriage Dynamics and Fertility in the Era of HIV and AIDs in Mahikeng local Municipality of the North West Province, South Africa. PhD thesis in Population Studies, *North-West University*, 2016.

Pazvakawambwa, L. 2015. Multivariate statistical Modelling of Family formation processes among women in Namibia. PhD dissertation in Applied Statistics, *University of Namibia*, 2014, p56.

Rossouw, L., R. Burger, R. Burger. 2012. The fertility transition in South Africa: A retrospective panel data analysis. Stellenbosch: *Department of Economics and Bureau for Economic Research, Stellenbosch University*; 2012.

Sayi, T.S. 2014. Relationships between marriage and fertility transitions in sub-Saharan Africa. Decomposing Fertility Trends. *143000 (princeton.edu).*

South, S. J. 2001. The geographic context of divorce: Do neighbourhoods matter? *Journal of Marriage and Family*, 63(3), 755–766. https://doi.org/10.1111/j.1741-3737.2001.00755.x

Statistics South Africa (Stats SA). 2015. *Census 2011:* Fertility in South Africa. (Report No. 03-01–63). *Pretoria: Statistics South Africa.*

——2016. South Africa Community Survey 2016 Data. *Pretoria: Statistics South Africa.*

——2017. South Africa Demographic and Health Survey 2016: Key Indicator Report (RP: 03-00-09), 74pp. *Pretoria: Statistics South Africa.*

Swartz, L. 2003. Fertility Transition in South Africa and its implications on the four major population groups. *Department of Economics and Social Affairs*, 539-553

Wei, J., J. Xue, D. Wang. 2018. Socioeconomic determinants of rural women's desired fertility: A survey in rural Shaanxi, China. *PLoS ONE* 13(9): e0202968. https://doi.org/ 10.1371/ journal.pone.0202968.