Exploring adolescent fertility inequality in Southern Africa

M Shoko, PhD

School of Public Health, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa; Stellenbosch Business School, Cape Town, South Africa; Statistics South Africa, Pretoria, South Africa

Corresponding author: *M Shoko (Mercysh@statssa.gov.za)*

Background. Globally, adolescent fertility rates (AFR) vary widely, with stark inequality in the Southern African subregion. Orphanhood and parental absence are key social factors studied in relation to adolescent fertility, but research focusing on girls aged 15 - 19 years is constrained by the international age cap of 17 years for collecting direct orphanhood and living arrangement data.
Objectives. To characterise fertility among adolescents largely excluded from research because of age restrictions in the data.
Methods. The study uses the cross-sectional household-based Demographic and Health Survey (DHS) data for Southern Africa, defined according to both local and international geoschemes. It models parental absence and intrahousehold effects on fertility for adolescents aged 15 - 19 years old, using the fixed effects logistic regression, adjusting for inter-country differences.
Results. The relationship between orphanhood, parental absence and rates of adolescent childbearing varied across countries. Parent absence was associated with a higher likelihood of childbearing (adjusted odds ratio (aOR) 3.07, $p<0.05$). Conversely, having an orphaned child(ren) in the household was associated with a 36% lower likelihood of childbearing, though not statistically significant. Compared with South Africa (SA), all the countries in the study showed significantly higher odds of adolescent childbearing (aOR 1.4 - 5.4, $p<0.05$). The probability of adolescents giving birth was generally lower when residing with orphaned children in the household, with Angola, Malawi and Zambia showing the highest differences, and SA the smallest.
Conclusions. The study underscores the critical role of household living arrangements and parental absence in understanding and addressing adolescent fertility in Southern Africa. Addressing this issue necessitates a dual approach, encompassing interventions for adolescents in general and specifically targeting those with absent parents.

S Afr J Child Health 2024;18(2):e1130. https://doi.org/10.7196/SAJCH.2024.v18i2.1130

The study focuses on adolescent fertility inequality in the context of orphanhood/fosterage and their potential spill-over effect in Southern Africa. This research is particularly important given the contemporary global focus on addressing inequality, including disparities in adolescent fertility,[1] as highlighted by the interconnected and inclusive development goals of the 2030 Sustainable Development Goals agenda (SDGs).[2]

Although adolescent fertility rates (AFR) have drastically declined in recent years, this remains a common issue.[3] Typically measured within the age range of 15 - 19 years, adolescent fertility continues to be a major issue despite this age group generally being considered old enough.[4] As a public health issue, adolescent fertility is both a key determinant and consequence of health and wellbeing. This is because it intersects with various other factors: HIV prevalence,[5] child marriage[6] and general socioeconomic development.[7] Adolescent fertility is also an important demographic indicator linked to overall fertility,[3] and therefore is potentially affected by living arrangements.[8]

The interconnections between adolescent childbearing and underlying socioeconomic inequalities are well-documented.[9] For instance, selection effects in adolescent fertility are closely intertwined with socioeconomic disparities.[10,1] This underscores adolescent fertility as a notable concern, particularly among female subpopulations disproportionately affected.

Research on general orphanhood, a long-recognised demographic issue,[11] and the associated parental presence[12-16] has gained traction, largely owing to the growing causes linked to adult mortality,[3] resulting in a parallel rise in orphanhood. However, research specifically addressing the link between these factors and adolescent fertility remains limited. The research gap is partly attributed to the limited availability of data on orphanhood and fosterage for 'older children' or adolescents (ages 18 - 19). This limitation arises from the international standard definition of 17 years as the upper age limit for orphanhood and fosterage, a definition adhered to by the widely used Demographic and Health Survey (DHS) surveys programme.

However, adolescents aged 18 - 19 years, while technically outside the standard orphanhood definition, often face distinct vulnerabilities.[17] For example, orphanhood in this age group is estimated to reach true orphanhood in both its extent and experiences. Demographically, adolescents aged 18 - 19 constitute the majority of orphans and may be less likely to be understated in surveys, a feature associated with the younger cohorts.[18] Older adolescents also experience disproportionate adverse wellbeing outcomes.[19] This arises from the kinship networks' preferences for fostering younger orphans, often on the pretext that younger orphans may be more vulnerable or adaptable.[20] Older orphans may also not be retained within kinship networks, especially where child fostering is incentivised.[19] Notably, the fosterage of older female orphans may be motivated by benefits received by the households, such as securing bride prices or assistance with household chores.[21] In situations where entire households consist of orphans, they may be left to their own devices if an older adolescent is present, leaving older adolescents assuming a *de facto* household headship status.[20]

Methods

The study used the DHS data for Southern Africa to conduct a multi-country analysis of adolescent fertility among girls aged 15 - 19 years. To define the geographical scope, the study employs both local and international classification frameworks for the subregion.[22,23] This includes the 10 countries that are geographically contiguous and located in the southernmost part of the African continent: Angola, Botswana, Eswatini, Lesotho, Malawi, Mozambique, Namibia, South Africa (SA), Zambia and Zimbabwe.

The decision to use the DHS surveys is based on the availability of nationally representative data. Although the individual country surveys may not be conducted concurrently, the fundamental design of these surveys facilitates cross-country and cross-temporal comparisons. DHS surveys are typically cross-sectional surveys that are conducted by participating low- and middle-income countries (LMICs) at approximately 5-year intervals. However, not all countries consistently carry out DHS surveys in each round and the DHS programme itself is continually evolving. The variation in survey frequency impacts the data availability for different countries (Fig. 1), which presents AFR trends for countries using DHS data.

Furthermore, the variability in the availability of DHS survey data for countries informs the inclusion criteria for the current study. For example, Botswana's only participation in the DHS program was in the late 1980s. The key data definitions used in that survey have since become outdated, rendering the data ineligible for inclusion in the current study.

Table 1 shows the respective DHS survey years used in the study, covering the period from 2006 - 2016 and presenting the most recently available data from the respective countries.

The choice to focus on Southern Africa is because of the subregion's distinctive characteristics, notably its pronounced global and internal disparities when compared with other regions and countries worldwide.[27] These factors are intricately connected to the fundamental determinants of adolescent fertility and are discussed below.

Despite undergoing an advanced fertility transition overall,[3] adolescent fertility remains an issue in the subregion (Fig. 1).[24] The subregion also faces a disproportionate adolescent HIV epidemic that predominantly affects the female subpopulation. This mirrors the broader HIV burden within the subregion and holds a direct link to adolescent fertility, given the heterosexual nature of HIV transmission.[25] This HIV epidemic has also adversely impacted households,[3] exacerbating the already prevalent issues of orphanhood and parental absence. These challenges stem from long-standing labour migration patterns, which in turn contribute to the prevailing marriage, childbearing and child-rearing practices.[26] Additionally, factors such as armed conflicts,[14] the more recent impact of the COVID-19 epidemic[16] and orphanhood resulting from cancer-related mortality[13] all play a role in shaping the landscape of orphanhood within the subregion. This underscores the importance of research on adolescent fertility.

The methodology used for this analysis was adopted from studies by Taiwo[28] and Jayatillake *et al.*[29] The study by Taiwo explored the potential spill-over effect of orphan fosterage on fertility across all women of childbearing ages, while Jayatillake *et al.*'s study focused on accounting for inter-country effects within a multi-country analysis. The results from the study by Taiwo suggest an independent association between the fostering of orphans and a reduction in fertility for women of childbearing age in the receiving households. However, in the current study, the focus is narrowed to female adolescents within the quinquennial age range of 15 - 19.

The main underlying assumption is that female adolescents may adjust their fertility goals based on their household circumstances. Previous research using longitudinal data spanning ages 15 - 25 years has shown that orphaned adolescents may have higher fertility compared with their non-orphan counterparts, either because of their increased vulnerability or higher fertility desires.[30]

For the analysis, the data used were generated by merging the household member (PR) and individual recodes (IR) obtained from representative samples of households and women of reproductive ages, respectively. To ensure representativity, enable inter-country comparisons and achieve a substantial sample size, the merged data were consolidated into a single aggregated data file. Subsequently, households were tagged to create the orphan index variable, identifying individuals aged 17 years and younger with at least one parent dead as orphans. The methodology is consistent with the established methodology outlined by the DHS.[31] The parental presence variable was derived using the 'relationship to the household head' question, with a focus on usual residents within the household to establish typical living arrangements. For instance, parental presence could be identified when the index individual is listed as a biological son or daughter of the household head or if they are the head of the household, and their parent is part of the household. Alternatively, if the head of the household is the grandparent and their son or daughter, along with their child(ren) are listed on the household schedule, this indicates parental presence.

Furthermore, the research uses other readily available variables from the DHS datasets, such as country-specific wealth quintiles and rural-urban residence. These variables are specifically designed to measure subnational disparities and are included as control variables in the study. Additionally, the study includes the survey country variable.

Weighting was applied using a combination of the standard individual recode and the population distribution of female adolescents aged between 15 and 19 years within the respective individual countries in the study. These population estimates were obtained from the United Nations Population Division World Population (WPP) estimates.[32] A fixed effects logistic model was then employed to account for the complex sample design across the aggregated datasets. In cases where strata consisted of single units, the analysis assumed that the strata shared the same variance as the average variance of strata from multiple sampling units. Additionally, the analysis adjusted for cluster effects to account for inter-country differences, utilising a method developed by Jayatillake *et al.*[29]

The following is the resultant logistic model used:

$$logit\left(b^{i*}\right) = \theta + \alpha b^{i} + \beta b^{f} + \theta p + \mu d + \delta c + \gamma c * b^{f} + \varepsilon_{c}$$

Where:

Eqn 2 b^{i*} represents the probability of an adolescent ever giving birth,

Eqn 3 b^{i} represents the type of residence,

Eqn 4 b^{f} presence of an orphan in the household,

Eqn 5 b^{f} the wealth index of the household,

Eqn 6 p presence/absence of parents in the household for the index adolescent,

Eqn 7 c, the country, and

Eqn 8 ε_{c} represents the country cluster effect.

Patient and public involvement statement

The article will be shared with the DHS programme facilitating its dissemination and circulation in accordance with the stipulated conditions for data access. The study did not involve direct patient or public participation.

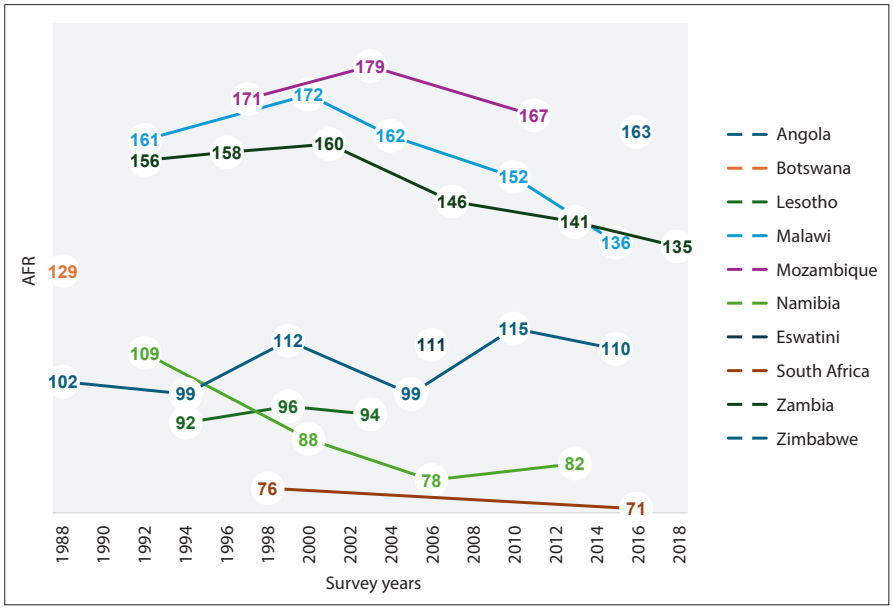

Fig. 1. Adolescent fertility rate for the 3 years preceding the survey per 1 000 females aged 15 - 19 years, by country and survey years - source of data - ICF (2021).
AFR = adolescent fertility rate.

Table 1. DHS surveys used in the study, by country and year of data collection

Country	Survey year
Angola	2015/16
Eswatini	2006/7
Lesotho	2014
Malawi	2015/6
Mozambique	2011
Namibia	2013
South Africa	2016
Zambia	2018
Zimbabwe	2015

Ethical considerations

The DHS survey protocols are reviewed and approved by the relevant bodies in the US where the DHS programme is based, and in the respective host countries where the surveys are conducted. For the current study specifically, ethical clearance was granted by the University of the Witwatersrand Human Research Ethics Committee (Medical) (ref. no. M220548).

Results

The sample sizes for the study were as follows: ~1 500 each for Lesotho, Mozambique and SA, 1 700 for Namibia, ~2 000 for Zimbabwe, ~2 500 for Eswatini and Malawi and 3 000 for Angola and Zambia (Table 2). The χ^2 test results showed variations in adolescent births across the selected Southern African countries based on the following household circumstances: parental presence, rural-urban residence and wealth quintiles. The findings show that parental presence was significantly associated with a lower likelihood of adolescent childbearing across all nine countries. This was also true for the presence of an orphan in the households in Angola, Lesotho, Malawi, Mozambique, Zambia and Zimbabwe.

The findings from the fixed logistic model suggested that the presence of orphans in the household was associated with a 36% lower likelihood of childbearing, although this was not statistically significant. Conversely, the absence of at least one parent for the index adolescent was statistically associated with a higher likelihood of childbearing (aOR 3.07, $p<0.05$). While the extent of this association varied across countries, all countries showed higher odds of adolescent fertility compared with SA, which was the reference (aOR 1.4 - 5.4, $p<0.05$).

Fig. 1 shows the marginal probabilities to show the variability in the effect of orphan presence in the household, on adolescent fertility among the nine included countries. The probability of an adolescent giving birth was generally lower in most Southern African countries for adolescents residing with orphaned children in the household, compared with those who were not. Angola, Malawi and Zambia showed the highest differences, and SA the smallest difference.

Discussion

The findings suggest interesting but highly complex insights. The research highlights the importance of household relations variables in understanding child-parent co-residence, an aspect that has been largely overlooked in previous studies.

In the current study, the absence of parents for the index adolescent was associated with a higher likelihood of adolescent fertility. The potential protective role of parental presence against adolescent fertility is supported by a recent study conducted in the Philippines. This study also used DHS data and the 'relationship to the household head' variable to examine parent-adolescent co-residency. Their findings corroborated those of the current study, showing that female adolescents aged 15 - 19 years who lived without either parent were more likely to become pregnant.[37]

The intercountry disparities shown in the study are also notable, highlighting the need to consider country-specific contexts when addressing adolescent fertility and related policies. For instance, the study confirms the established knowledge that SA has the lowest fertility rates among adolescents relative to that of the rest of the countries in the subregion and the broader sub-Saharan Africa (SSA region).[3] This conclusion also holds, independently when applying Kisambira's standard.[33] However, the low adolescent childbearing in SA should be seen in the context of high unwanted premarital adolescent fertility in the country,[34] alongside the globally record-high levels of parental absence.[38]

The results also appear to underscore the existing disparities within the Southern Africa subregion but with a notable convergence within its southernmost part. For example, there are relatively lower adolescent childbearing levels for the five southernmost countries, which also constitute 'Southern Africa' using an alternative definition, including SA, Namibia, Lesotho, Eswatini and Botswana.[35] Angola, Mozambique, Malawi and Zambia globally have some of the highest fertility overall.[3] Zimbabwe has experienced a complex fertility transition, with one of the earliest transitions, one of the longest stalls, and consistently and relatively

Table 2. Percentage of adolescent girls aged 15 - 17 years by country, according to birth outcomes and selected household characteristics

Country	*N*	Adolescent birth (%)		χ^2
		Yes	No	
South Africa	1 497			
Resides with orphan child(ren)		15.91	84.09	0.954
Does not reside with orphan child(ren)		15.58	84.42	
Parent present		10.81	89.19	<0.000
Parent absent		23.22	76.78	
Rural residence		17.57	82.43	0.126
Urban residence		13.87	86.13	
Poorest		22.46	77.54	<0.000
Poorer		26.29	73.71	
Middle		18.18	81.82	
Richer		8.33	91.67	
Richest		6.32	93.68	
Mozambique	1 527			
Resides with orphan child(ren)		30.36	69.64	0.069
Does not reside with orphan child(ren)		42.58	57.42	
Parent present		20.92	79.08	<0.000
Parent absent		47.50	52.50	
Rural residence		44.12	55.88	<0.000
Urban residence		31.75	68.25	
Poorest		56.99	43.01	<0.000
Poor		46.90	53.10	
Middle		52.82	47.18	
Richer		45.86	54.14	
Richest		27.13	72.87	
Zimbabwe	2 088			
Resides with orphan child(ren)		9.84	90.16	0.007
Does not reside with orphan child(ren)		24.88	75.12	
Parent present		11.14	88.86	<0.000
Parent absent		30.19	69.81	
Rural residence		27.95	72.05	<0.000
Urban residence		10.92	89.38	
Poorest		37.28	62.72	<0.000
Poor		28.98	71.02	
Middle		30.14	69.86	
Richer		21.46	78.54	
Richest		7.04	92.96	
Zambia	2 987			
Resides with orphan child(ren)		9.52	90.48	0.001
Does not reside with orphan child(ren)		33.36	66.64	
Parent present		23.57	76.43	<0.000
Parent absent		38.42	61.58	
Rural residence		37.81	62.19	<0.000
Urban residence		20.96	79.04	
Poorest		50.36	49.64	<0.000
Poor		44.63	55.37	
Middle		37.85	62.15	
Richer		22.88	77.12	
Richest		7.88	92.12	

...continued

Table 2. (continued) Percentage of adolescent girls aged 15 - 17 years by country, according to birth outcomes and selected household characteristics

Country	*N*	Adolescent birth (%)		χ^2
		Yes	No	
Malawi	2 589			
Resides with orphan child(ren)		10.84	89.14	<0.001
Does not reside with orphan child(ren)		34.16	65.84	
Parent present		13.80	86.20	<0.001
Parent absent		38.45	61.55	
Rural residence		22.37	77.63	0.023
Urban residence		36.67	63.33	
Poorer		52.50	47.50	<0.001
Poor		43.05	56.95	
Middle		37.83	62.17	
Richer		31.60	68.40	
Richer		17.34	82.66	
Namibia	1 783			
Resides with orphan child(ren)		20.00	80.00	0.846
Does not reside with orphan child(ren)		21.62	78.32	
Parent present		16.49	83.51	0.010
Parent absent		22.07	77.93	
Rural residence		21.33	78.67	<0.001
Urban residence		17.18	82.82	
Poorest		30.64	69.36	<0.001
Poor		31.25	68.75	
Middle		24.37	75.63	
Richer		18.66	81.34	
Richest		7.04	92.96	
Lesotho	1 526			
Resides with orphan child(ren)		6.15	93.85	0.002
Does not reside with orphan child(ren)		22.15	77.85	
Parent present		12.03	87.97	<0.001
Parent absent		29.83	70.17	
Rural residence		23.45	76.55	<0.001
Urban residence		12.74	87.26	
Poorest		30.13	69.87	<0.001
Poor		24.34	75.66	
Middle		23.44	76.56	
Richer		16.84	83.16	
Richest		5.33	94.67	
Eswatini	2 442			
Resides with orphan child(ren)		16.67	83.33	0.132
Does not reside with orphan child(ren)		24.49	75.51	
Parent present		19.93	80.07	0.014
Parent absent		28.09	71.91	
Rural residence		24.83	75.17	0.094
Urban residence		19.86	80.14	
Poorest		34.38	65.63	<0.001
Poor		27.78	72.22	
Middle		28.32	71.68	
Richer		22.00	78.00	
Richest		15.29	84.71	

...continued

Table 2. (continued)Percentage of adolescent girls aged 15 - 17 years by country, according to birth outcomes and selected household characteristics

		Adolescent birth (%)		
Country	*N*	Yes	No	χ^2
Angola	3 261			
Resides with orphan child(ren)		26.53	61.52	0.016
Does not reside with orphan child(ren)		38.48	73.47	
Parent present		25.08	74.92	<0.001
Parent absent		54.31	45.69	
Rural residence		48.88	51.12	<0.001
Urban residence		32.46	67.54	
Poorest		46.35	53.65	<0.001
Poor		56.24	43.76	
Middle		44.27	55.73	
Richer		25.12	74.88	
Richest		13.82	86.18	

Table 3. Logistic model for adolescent birth

Adolescent birth	aOR*	SE	P>t	[95% CI]
Orphan child(ren) in household				
No (ref)	-	-	-	-
Yes	0.64	0.31	0.350	[0.61 - 3.76]
Parent/s presence in the household				
No	3.07	0.30	<0.000	[2.53 - 3.71]
Yes (ref)	-	-	-	-
Area of residence				
Urban (ref)	-	-	-	-
Rural	0.87	0.09	0.191	[0.71 - 1.07]
Wealth index				
Poorest	6.60	0.89	<0.000	[5.07 - 8.59]
Poor	5.02	0.65	<0.000	[3.90 - 6.46]
Middle	4.26	0.53	<0.000	[3.34 - 5.44]
Richer	2.55	0.28	<0.000	[2.06 - 3.16]
Richest (ref)	-	-	-	-
Country				
South Africa (ref)	-	-	-	-
Mozambique	5.39	0.80	<0.000	[4.03 - 7.21]
Zimbabwe	2.03	0.31	<0.000	[1.50 - 2.73]
Zambia	3.09	0.45	<0.000	[2.31 - 4.11]
Malawi	3.41	0.50	<0.000	[2.56 - 4.55]
Namibia	1.44	0.23	0.021	[1.06 - 1.96]
Lesotho	1.84	0.31	<0.000	[1.32 - 2.56]
Eswatini	1.99	0.33	<0.000	[1.43 - 2.76]
Angola	3.43	0.40	<0.000	[2.72 - 4.31]
Country*presents of orphan child(ren) in the household				
South Africa*yes (ref)	-	-	-	-
Mozambique*yes	0.83	0.52	0.761	[0.24 - 2.83]
Zimbabwe*yes	0.45	0.30	0.227	[0.13 - 1.64]
Zambia*yes	0.27	0.20	0.080	[0.06 - 1.17]
Malawi*yes	0.28	0.19	0.055	[0.07 - 1.03]
Namibia*yes	1.22	1.02	0.811	[0.24 - 6.30]
Lesotho*yes	0.17	0.17	0.016	[0.04 - 0.71]
Eswatini*yes	0.57	0.87	0.829	[0.23 - 3.19]
Angola*yes	0.33	0.18	0.048	[0.11 - 0.98]

aOR = adjusted odds ratio; SE = standard error; P>t = *p*-value.

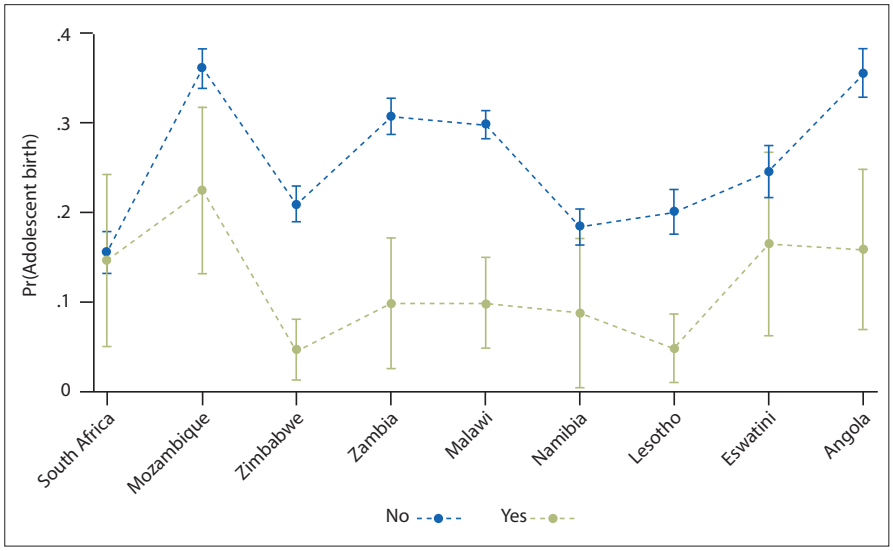

Fig. 2. Marginal probabilities for an adolescent birth (Pr) for each country in the study, relative to the presence of an orphan/foster child(ren) in the household. Blue dotted line (No); Green dotted line (Yes).

high premarital fertility.[3,36] Zimbabwe is categorised within the 'Southern Africa' group, characterised by medium overall fertility levels.[3] In the study, results suggest that adolescent childbearing in Zimbabwe is also relatively low.

Some results from the study seemed counterintuitive. This includes possible protective effects of orphan presence on adolescent fertility. This seemingly paradoxical finding aligns with a previous study using data collected from cities in the USA and SA, that found that living with other people who are not biological parents may be protective of adolescent sexuality.[39] Likewise, results from a longitudinal study in Ouagadougou also showed a lower risk of premarital pregnancy for females who lived with neither parent, compared with their counterparts who lived with a parent.[40] These results may be indicative of the complex interplay of living arrangements, parental presence and adolescent fertility.

Nonetheless, the study results should be interpreted in the context of important limitations. This includes temporal issues, particularly the relatively wide data window spanning 2006 - 2016 as well as whether adolescent fertility preceded the reported living arrangements or vice versa. This may have affected comparisons across countries because of the expected decline in adolescent fertility over time. This is especially relevant for temporal variations in the broader trends of orphanhood and fosterage, as well as the dynamics of household absorption over time.

The research has delved into the complex relationship between adolescent fertility, a common demographic phenomenon, and previously unexplored yet increasingly emphasised socioeconomic factors—orphanhood and parental absence. Challenges related to the utilisation of surveys in this context have also been identified.[41] For example, the household-based samples exclude non-household populations that may be at a disproportionate risk of adolescent fertility. The household typology also affects household constitution and intra-household relationships, as other 'members' may be excluded. In DHS surveys, a household typically constitutes usual members and visitors at a designated reference time.[31] This potentially excludes individuals who are away for extended periods such as migrant populations, who may still contribute to their children's lives through remittances and periodic visits. This is exacerbated by the complex African household dynamics that may be relatively difficult to decipher using the 'relationship to household head', for example, multiple household membership.

Further research using longitudinal data may unpack some of the results presented here. This underscores the importance of functional civil registrations and vital statistics systems (CRVS) systems that allow better tracking of progress in reducing adolescent fertility.

Conclusions

The study presents findings with important policy implications. The study explored the potential spill-over effect of orphanhood or fosterage on adolescent fertility across countries in Southern Africa. Tailored approaches are necessary to address adolescent fertility within the unique contexts of individual countries, considering factors such as orphanhood, parental presence and broader sociocultural and economic influences. Additionally, the study showcases the utility of household relations variables to identify child-parent co-residence, a largely underutilised aspect.

Declaration. The manuscript was prepared in partial fulfilment of a PhD degree at the University of the Witwatersrand.

Acknowledgements. I would like to acknowledge the DHS Program for providing the valuable data used in this study.

Author contributions. Sole author.

Funding. None.

Conflicts of interest. None.

1. Neal S, Channon A, Chandra-Mouli V, et al. Trends in adolescent first births in sub-Saharan Africa: A tale of increasing inequity? Int J Equity Health 2020;19:151. https://doi.org/10.1186/s12939-020-01251-y
2. UN General Assembly. Transforming our world: The 2030 Agenda for Sustainable Development. A/RES/70/1. 2015.
3. Bongaarts J, Hodgson D. Fertility transition in the developing world. Cham: Springer International Publishing 2022.
4. Dixon-Mueller R. How young is "too young"? Comparative perspectives on adolescent sexual, marital, and reproductive transitions. Stud Family Planning 2008;39:247-262. https://doi.org/10.1111/j.1728-4465.2008.00173.x
5. Khalifa A, Stover J, Mahy M, et al. Demographic change and HIV epidemic projections to 2050 for adolescents and young people aged 15-24. Glob Health Action 2019;12:1662685. https://doi.org/10.1080/16549716.2019.1662685
6. Wang Y, Qiao J. Trends and social determinants of adolescent marriage and fertility in China. Lancet Glob Health 2020;8:e873-874. doi:10.1016/S2214-109X(20)30207-2
7. Nagata J. Global health priorities and the adolescent birth rate. J Adolescent Health 2017;60:131-132. https://doi.org/10.1016/j.jadohealth.2016.11.009
8. Moultrie T, Timaeus I. Fertility and living arrangements in South Africa. J Southern Afr Stud 2001;27:207-223. https://doi.org/10.1080/03057070120049930
9. Wilkinson R, Pickett K. The spirit level: Why more equal societies almost always do better. Penguin Books 2009.
10. Timaeus I, Moultrie T. Teenage childbearing and educational attainment in South Africa. Stud Family Plann 2015;46:143-160. https://doi.org/10.1111/j.1728-4465.2015.00021.x
11. Burch TK, Dewit DJ. Effects and consequences of orphanhood in past populations: North America. In: Population Studies Centre University of Western Ontario London, Canada. Costa Rica: 1984.
12. Evans D, Popova A. West African ebola crisis and orphans. Lancet 2015;385. https://doi.org/10.1016/S0140-6736(15)60179-9
13. Guida F, Kidman R, Ferlay J, et al. Global and regional estimates of orphans attributed to maternal cancer mortality in 2020. Nat Med 2022;28:1-10. https://doi.org/10.1038/s41591-022-02109-2
14. Wagner Z, Heft-Neal S, Wise P, et al. Women and children living in areas of armed conflict in Africa: A geospatial analysis of mortality and orphanhood. Lancet Glob Health 2019;7. https://doi.org/10.1016/S2214-109X(19)30407-3

15. Kidman R. Use HIV's lessons to help children orphaned by COVID-19. Nature 2021;596:185-188. https://doi.org/10.1038/d41586-021-02155-9
16. Unwin H, Hillis S, Cluver L, et al. Global, regional, and national minimum estimates of children affected by COVID-19-associated orphanhood and caregiver death, by age and family circumstance up to Oct 31, 2021: An updated modelling study. Lancet Child Adolesc Health 2022;6. https://doi.org/10.1016/S2352-4642(22)00005-0
17. Popoola T, Mchunu G. HIV orphanhood research and the representation of older orphans in sub-Saharan Africa: A literature review. J Assoc Nurses AIDS Care 2015;27. https://doi.org/10.1016/j.jana.2015.09.002
18. Mejia-Pailles G, Berrington A, McGrath N, et al. Trends in the prevalence and incidence of orphanhood in children and adolescents <20 years in rural KwaZulu-Natal South Africa, 2000-2014. PLOS ONE 2020;15:1-17. https://doi.org/10.1371/journal.pone.0238563
19. Dahl B. The drama of de-orphaning: Botswana's old orphans and the rewriting of kinship relations. Soc Dynam 2016;42:289-303. https://doi.org/10.1080/02533952.2016.1206063
20. Foster G, Makufa C, Drew R, et al. Factors leading to the establishment of child-headed households: The case of Zimbabwe. Health Transition Review 1997.
21. Hunter S, Williamson J. Children on the brink: Strategies to support children isolated by HIV/AIDS. TvT, Pragma, USAID 1997.
22. African Union Commission and New Zealand Crown. A Guide for those working with and within the African Union: African Union Handbook 2022.
23. UNAIDS. Global Report: UNAIDS Report on the Global AIDS Epidemic: 2010.
24. ICF. The DHS program STATcompiler. 2021. http://www. statcompiler.com (accessed 30 Jul 2021).
25. Christofides N, Jewkes R, Dunkle K, et al. Early adolescent pregnancy increases risk of incident HIV infection in the Eastern Cape, South Africa: A longitudinal study. Journal of the International AIDS Soc 2014;17:18585. https://doi.org/10.7448/IAS.17.1.18585
26. Timaeus I, Graham W. Labor circulation, marriage, and fertility in Southern Africa. In: Reproduction and social organisation in sub-Saharan Africa. Berkeley: University of California Press 1989:365-400. https://doi.org/10.1525/9780520335455-011
27. UNECA. Economic Report on Africa 2017.
28. Taiwo O. Sharing the burden of parental death: Intrafamily effects of HIV/AIDS orphans on fertility and child quality. Econ Dev Cult Change 2012; 60:279-309. https://doi.org/10.1086/662578
29. Jayatillake R, Sooriyarachchi R, Senarathna L. Adjusting for a cluster effect in the logistic regression model: An illustration of theory and its application. J National Sci Foundation of Sri Lanka 2011;39. https://doi.org/10.4038/jnsfsr.v39i3.3624
30. Kidman R, Anglewicz P. Fertility among orphans in rural Malawi: Challenging common assumptions about risk and mechanisms. Int Perspect Sexual Reproduct Health 2014;40:164-175. https://doi.org/10.1363/4016414
31. DHS. Guide to DHS Statistics DHS-7 (version 2). Rockville, USA: 2018.
32. UN. World Population Prospects 2019, Online Edition. Rev.1. 2019.
33. Kisambira S, Biddlecom A, Kantorová V. Adolescent fertility since the International Conference on Population and Development (ICPD) in Cairo. 2013; 54p.
34. Swartz L. Fertility transition in South Africa and its impact on the four major population groups. Population Bulletin of the United Nations: Completing the fertility transition. Special Issue Nos 48/49 2002.
35. UNSD. Standard country or area codes for statistics use 1999 (Revision 4). 1999. https://unstats.un.org/unsd/publication/SeriesM/Series_M49_Rev4(1999)_en.pdf
36. Ngwenya CL. An investigation into the progression of premarital fertility since the onset of Zimbabwe's fertility transition. 2021. https://open.uct.ac.za/handle/11427/36110
37. Tabei K, Cuisia-Cruz E, Smith C, et al. Association between teenage pregnancy and family factors: An analysis of the Philippine National Demographic and Health Survey 2017. Healthcare 2021;9:1720. https://doi.org/10.3390/healthcare9121720
38. Lippman L, Wilcox BW. World Family Map 2014: Mapping Family Change and Child Well-Being Outcomes. Institute for Family Studies. Social Trends, New York.
39. Mmari K, Kalamar AM, Brahmbhatt H, et al. The influence of the family on adolescent sexual experience: A comparison between Baltimore and Johannesburg. PLOS ONE 2016;11:1-14. https://doi.org/10.1371/journal.pone.0166032
40. Soura B, Lankoande B, Sanogo S, et al. Understanding premarital pregnancies among adolescents and young women in Ouagadougou, Burkina Faso. Cogent Soc Sci 2018;4. https://doi.org/10.1080/23311886.2018.1514688
41. Treiman DJ, Lu Y, Qi Y. New Approaches to Demographic Data Collection. Chinese Sociolog Rev 2012;44:56-92. https://doi.org/10.2753/CSA2162-0555440303

Accepted 26 January 2024.