Background: The prevalence and effect of polygamous relationships may have serious reproductive and/or health consequences for women. In South Africa, unlike in other sub-Saharan countries, no nationwide survey has investigated polygamy except for the 2002 HIV/AIDS population-based household survey. The aim of this study was to profile socio-demographic and behavioural characteristics associated with women in polygamous relationships in South Africa using the 2002 survey data.

Methods: The survey data were collected using a multi-stage stratified cluster randomised sampling design. Bivariate and multivariate logistic regression models were used to assess the relationship between polygamy, and selected socio-demographic and behavioural factors.

Results: Of 1437 women who responded to the question on polygamy, 8.3% reported being in a polygamous marriage. Women in polygamous marriages were significantly less likely to have tertiary education [OR = 0.03 (95% CI: 0.00–0.28), p = 0.003], to have money for food and clothes [OR = 0.12 (95% CI: 0.06–0.27), p < 0.001], to have a sexual partner five years younger [OR = 0.10 (95% CI: 0.01–0.94), p = 0.044] or sexual partner within 5 years older or younger [OR = 0.35 (95% CI: 0.13–0.991), p = 0.032]. They were also significantly more likely to have two or more sexual partners [OR = 20.42 (95% CI: 1.10–379.89), p = 0.043].

Conclusion: The finding that polygamy is associated with uneducated and women of low economic means, who have relationships with older men and multiple sexual partners warrants further attention. Contemporary studies on polygamy are needed in South Africa.

Keywords: Polygamy, Marriage, Women, Socio-demographic, Behaviour, South Africa
loneliness, unhappiness, emptiness and feeling of neglect [1, 5, 6]. Some studies suggest that the experiences and effects of polygamous relationships on women can be mediated by their socio-demographic background [5, 6]. Evidence shows that education, employment and place of residence were important determinants of being in polygamous marriages for women, and the effect varies depending on the context and setting [5, 6].

Polygamy may have negative effects and influences on women’s reproductive health [7–9]. These include barriers to conversations around family planning issues such as contraception use and child bearing. Moreover, women in polygamous marriages are at increased risk of acquiring sexually transmitted infections (STIs) including HIV, and being subjected to intimate partner violence. All these are attributed to gender-power differences in such relationships [7–9]. Since women in polygamous relationships tend to have less power they are more likely to suffer from sexual, emotional and psychological abuse [10].

Consequently, polygamy has been criticized [7–9]. However, polygamy continues to be practiced in much of Africa [7–9, 11]. In South Africa, polygamy has a long history in some cultures, and males with both middle and low socio economic background practice contemporary polygamy [11]. However, there is limited data on polygamy and its effect in South Africa. Unlike in other sub-Saharan countries [2–4], no nationwide survey has investigated polygamous relationships except for the 2002 national HIV prevalence, behavioural risks and mass media household survey [12]. The sample size estimation was guided by the requirement for measuring change over time in order to detect a change in HIV prevalence in each of the main reporting domains at 5% level of significance, 80% power, two-sided test, and with a precision level of less than ±4%, and a design effect of 2. A total of sample size of 15,000 households / visiting points (VPs) was estimated for the survey based on these requirements.

A random sample of 15 VPs was selected using small units called enumerator areas (EAs) as defined by the 2001 population census from Statistics South Africa. One thousand EA’s were selected for inclusion in the study from a database of 86,000 EAs, yielding a total sample size of 15,000 households or VPs. The survey data were collected using multi-stage disproportionate, stratified sampling of residential households within EAs by province, race group and locality type (urban/rural
and formal/informal). All people in all the selected households were initially listed, and eligible individuals randomly selected to each represent age groups 2–14 years, 15–24 years, 25 years and older.

Age-appropriate individual questionnaires including parent/guardian for minors were administered to consenting eligible individuals to solicit information that included demographic characteristics, media and communication on HIV, sexual behaviours and practices related to HIV, and marriage practices such as polygamy where applicable. Out of a total of 13,518 individuals who were selected and contacted for the survey, 9963 (73.7%) people agreed to be interviewed. The current analysis is based on the sub-sample of adult data (25 years and older) of women who responded to the polygamy question.

### Measures
The primary outcome variable is polygamy based on the question “does your husband have other wives” (yes = 1 and n = 0). Explanatory variables included socio-demographic variables such as age (15 to 24 years = 1, 25 to 49 years = 2, 50+ years = 3), race (Black African = 1 and other races = 2 i.e. White, Coloured, and Indians/Asians), educational level (no education = 1, primary = 2, secondary = 3, tertiary = 4), employment status (not employed = 1, employed = 2), household vulnerability indicator (Not enough money for basic things like food and clothes = 1, have money for food and clothes, short on many other things = 2, have most of the important things, but few luxury goods = 3, money for extra things such as holidays and luxury goods = 4), type of religion, and the importance of religion.

### Table 1

| Age (years) | Total | % | 95% CI  | p-value |
|------------|-------|---|---------|---------|
| 25 to 49   | 961   | 4.0| 2.0–7.9 | 0.001   |
| 50+        | 476   | 14.6| 9.3–22.2|

| Race group          | Total | %  | 95% CI  | p-value |
|---------------------|-------|----|---------|---------|
| Black African       | 750   | 10.7| 7.2–15.5| 0.053   |
| Other               | 686   | 3.0 | 0.8–11.1|

| Education level     | Total | %  | 95% CI  | p-value |
|---------------------|-------|----|---------|---------|
| No education        | 208   | 22.7| 13.9–34.8| < 0.001 |
| Primary             | 611   | 7.2 | 4.4–11.3|
| Secondary           | 456   | 2.6 | 0.7–9.5 |
| Tertiary            | 155   | 0.5 | 0.1–2.9 |

| Employment status   | Total | %  | 95% CI  | p-value |
|---------------------|-------|----|---------|---------|
| Not Employed        | 960   | 8.9 | 5.8–13.3| 0.465   |
| Employed            | 442   | 5.9 | 2.1–15.7|

| Household Vulnerability indicator | Total | %  | 95% CI  | p-value |
|----------------------------------|-------|----|---------|---------|
| Not enough money for basic things like food and clothes | 521   | 14.2| 9.3–21.1| 0.005   |
| Have money for food and clothes, short on many other things | 485   | 6.3 | 2.6–14.6|
| We have most of the important things, but few luxury goods | 310   | 2.1 | 1.0–4.7 |
| Some money for extra things as holidays and luxury goods | 104   |     |         |         |

| Type of religion | Total | %  | 95% CI  | p-value |
|------------------|-------|----|---------|---------|
| Christian religion | 1032 | 7.8| 5.0–12.0| 0.247   |
| Other religion   | 303   | 3.9 | 1.2–11.6|

| Importance of religion | Total | %  | 95% CI  | p-value |
|------------------------|-------|----|---------|---------|
| Not important at all   | 21    | 18.5| 2.7–65.0| 0.538   |
| Slightly important     | 24    | 6.1 | 1.4–22.9|
| Somewhat important     | 28    | 17.9| 3.2–58.9|
| Important              | 214   | 5.7 | 2.5–125 |
| Very important         | 1133  | 8.6 | 5.5–13.1|

| Locality type | Total | %  | 95% CI  | p-value |
|---------------|-------|----|---------|---------|
| Urban Formal  | 931   | 4.2| 2.1–8.5 | 0.083   |
| Urban Informal | 109  | 12.0| 3.9–31.3|
| Rural informal | 326  | 13.2| 8.0–20.9|
| Rural Formal  | 71    | 11.9| 2.5–41.2|

*Subtotals do not add up to the overall total due to non-response and / or missing data.*
Table 2 Polygamous marriages among women by behavioural profile

| Number of sexual partners in the last 12 months? | Total | %   | 95% CI   | p-values |
|-----------------------------------------------|-------|-----|----------|---------|
| 2+ partners                                   | 15    | 24.0| 3.9–71.1 | 0.021   |
| 1 partner                                     | 1075  | 4.5 | 2.5–8.0  |         |
| Condom use last sex                           |       |     |          |         |
| No                                            | 286   | 7.2 | 2.0–23.3 | 0.737   |
| Yes                                           | 142   | 9.1 | 3.7–20.8 |         |
| Age mixing                                    |       |     |          |         |
| Partners five years and older                 | 379   | 7.7 | 3.4–16.6 | 0.003   |
| Partners five years younger                   | 40    | 1.0 | 0.1–7.0  |         |
| Partners within 5 years                       | 563   | 2.4 | 1.1–4.8  |         |
| Self-perceived risk of HIV infection          |       |     |          |         |
| No                                            | 1008  | 8.5 | 5.5–12.9 | 0.895   |
| Yes                                           | 414   | 8.0 | 3.9–15.9 |         |
| Ever tested for HIV?                          |       |     |          |         |
| No                                            | 1015  | 10.1| 6.7–14.7 | 0.003   |
| Yes                                           | 412   | 3.3 | 1.5–6.9  |         |
| Awareness of HIV status?                     |       |     |          |         |
| No                                            | 1054  | 9.8 | 6.6–14.4 | 0.008   |
| Yes                                           | 370   | 3.6 | 1.6–7.5  |         |
| HIV status                                    |       |     |          |         |
| Positive                                      | 110   | 8.9 | 3.4–21.4 | 0.985   |
| Negative                                      | 1100  | 8.8 | 5.7–13.3 |         |

Table 2 shows that polygamous marriages were significantly more common among women aged 50 years and older (14.6%, $p = 0.001$), uneducated (22.7%, $p = 0.001$) and lacking enough money for basic things like food and clothes (14.2%, $p = 0.005$). Although non-significant it was also common among women who were Black African (10.7%), unemployed (8.9%) and who resided in tribal (13.2%), urban informal (12.0%) and rural formal (11.9%) areas. It was also common among those who indicated they were of Christian religion (7.8) and who believed that religion was not important at all (18.5%).

Results

Polygamy and characteristics of the study participants

Of 1437 self-reported married women who responded to the question on polygamy, 8.3% (95% CI: 5.6–12) indicated that they were in a polygamous relationship. Figure 1 shows that polygamous marriages were common in Mpondowa (19.7%), Limpopo (51.1%) and KwaZulu-Natal provinces (13.8%).

Table 1 shows that polygamous marriages were significantly more common among women aged 50 years and older ($p = 0.001$), uneducated ($p = 0.001$) and lacking enough money for basic things like food and clothes ($p = 0.005$). Although non-significant it was also common among women who were Black African (10.7%), unemployed (8.9%) and who resided in tribal (13.2%), urban informal (12.0%) and rural formal (11.9%) areas. It was also common among those who indicated they were of Christian religion (7.8) and who believed that religion was not important at all (18.5%).

Table 2 shows that a significant majority of women in polygamous marriages had two or more sexual partners in the past twelve months (24.0%, $p = 0.021$), had sexual partners five years and older (7.7%, $p = 0.003$), had never tested for HIV (10.1%, $p = 0.003$), and were not aware of their HIV status (9.8%, $p = 0.008$).

Factors associated with polygamy

Table 3 shows bivariate models of factors associated with women involved in polygamous unions. Women were significantly more likely to be in a polygamous relationship if they were younger than 50 years old, were uneducated, and did not have enough money for basic things like food and clothes. Women in polygamous relationships were also significantly more likely to have an older sexual partner, multiple sexual partners and to never have tested for HIV and to be unaware of their HIV status.

In the final multivariate model (Table 4) women in polygamous marriages were significantly less likely to have tertiary education [OR = 0.03 (95% CI:0.00–0.28), $p = 0.003$], to have money for food and clothes [OR = 0.12 (95% CI: 0.06–0.27), $p < 0.001$], to have sexual partner who was five years younger [OR = 0.10 (95% CI: 0.01–0.94), $p = 0.044$], and sexual partner within 5 years older or younger than their age [OR = 0.35 (95CI: 0.13–0.91), $p = 0.032$]. On the other hand...
| Variables                                      | OR   | 95% CI | p-value |
|-----------------------------------------------|------|--------|---------|
| **Age (years)**                               |      |        |         |
| 25 to 49                                      | 1    |        |         |
| 50+                                           | 0.25 | 0.10   | 0.59    | 0.002 |
| **Race groups**                               |      |        |         |
| Black African                                 | 1    |        |         |
| Other                                         | 0.26 | 0.06   | 1.12    | 0.070 |
| **Education level**                           |      |        |         |
| No education                                  | 1    |        |         |
| Primary                                       | 0.26 | 0.12   | 0.57    | 0.001 |
| Secondary                                     | 0.09 | 0.02   | 0.41    | 0.002 |
| Tertiary                                      | 0.02 | 0.00   | 0.11    | <0.001|
| **Employment status**                         |      |        |         |
| Not employed                                  | 1    |        |         |
| Employed                                      | 0.65 | 0.20   | 2.10    | 0.468 |
| **Household vulnerability indicator**         |      |        |         |
| Not enough money for basic things like food and clothes | 1 | | | |
| Have money for food and clothes, short on many other things | 0.41 | 0.14 | 1.14 | 0.087 |
| We have most of the important things, but few luxury goods | 0.13 | 0.05 | 0.34 | <0.001 |
| Some money for extra things as holidays and luxury goods | | | | |
| **Type of religion**                          |      |        |         |
| Christian religion                            | 1    |        |         |
| Other religion                                | 0.48 | 0.13   | 1.71    | 0.257 |
| **Number of sexual partners in the last 12 months** |      |        |         |
| One partner                                   | 1    |        |         |
| Two or more partners                          | 6.66 | 1.05   | 42.08   | 0.044 |
| **Condom use last sex act**                   |      |        |         |
| No                                            | 1    |        |         |
| Yes                                           | 1.28 | 0.30   | 5.42    | 0.737 |
| **Age mixing**                                |      |        |         |
| Partner five years and older                  | 1    |        |         |
| Partner five years younger                    | 0.12 | 0.01   | 1.08    | 0.059 |
| Partner within 5 years                        | 0.29 | 0.12   | 0.71    | 0.007 |
| **HIV risk perception**                       |      |        |         |
| No                                            | 1    |        |         |
| Yes                                           | 0.94 | 0.40   | 2.24    | 0.895 |
| **Ever tested for HIV?**                      |      |        |         |
| No                                            | 1    |        |         |
| Yes                                           | 0.30 | 0.13   | 0.69    | 0.005 |
| **Awareness of HIV status?**                  |      |        |         |
| No                                            | 1    |        |         |
| Yes                                           | 0.34 | 0.15   | 0.78    | 0.011 |
| **HIV status**                                |      |        |         |
| Positive                                      | 1    |        |         |
| Negative                                      | 0.10 | 0.34   | 2.90    | 0.985 |
they were significantly more likely to have two or more sexual partners [OR = 20.42 (95% CI: 1.10–379.89), p = 0.043].

**Discussion**

This analysis profiled factors associated with self-reported polygamy among women using data from the 2002 nationally representative household survey. The relatively high prevalence of women reporting polygamous marriage in Mpumalanga province followed by Limpopo and KwaZulu-Natal provinces probably reflects the cultural contexts in these provinces. For example, the practise of polygamy is predominant among the Shangaan, Swati and Zulu tribes in South Africa [12, 13], which are found in these provinces.

The findings showed that women’s lack of education and lack of economic empowerment play predominant roles in polygamous relationships. Elsewhere in Africa evidence shows that involvement in polygamous marriage declines with increase in women’s education from secondary to higher level [3, 9]. This has been attributed to the fact that woman who are more educated are more likely to be economically independent and more likely to have power in relationships and hence are less likely to be in polygamous marriages [3, 14].

The findings also revealed that women in polygamous marriages were more likely to reside in financially vulnerable households with less money for food and short on many other things. This probably reflects the economic context of polygamy for the study population, which invariably transfers heavy economic burden to families of polygamous marriages where limited resources need to be stretched. Evidence shows that regardless of cultural differences the practice of polygamy impacts women’s livelihood in complex ways rendering them socially, economically and psychologically vulnerable [15].

Additionally the findings revealed that women in polygamous marriages have older partners. This is in line with evidence which suggests that mostly older males engage in polygamy rather than younger men [14]. Generally, this confirms observed patterns in most African communities where girls become brides shortly after puberty, while men get married at a more advanced age [16]. Typically, in polygamous marriages men often seek younger wives to satisfy their sexual needs. This perception is socially constructed around the assumption of men’s biologically determined greater sexual needs, which requires them to have several and often younger female partners to satisfy those needs [13].

The findings also showed that women in polygamous relationships were more likely to have that multiple sexual partners. It has been suggested that women in polygamous relationship often have clandestine affairs with

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**Table 4 Multivariate model of factors independently associated with women in polygamous marriages**

| Variables                                      | OR   | 95% CI   | p-values |
|------------------------------------------------|------|----------|----------|
| Education level                                |      |          |          |
| No education                                   | 1    |          |          |
| Primary                                        | 0.66 | 0.17     | 2.53     | 0.544   |
| Secondary                                      | 0.68 | 0.13     | 3.60     | 0.650   |
| Tertiary                                       | 0.03 | 0.00     | 0.28     | 0.003   |
| Household vulnerability indicators             |      |          |          |
| Not enough money for basic things like food and clothes | 1    |          |          |
| Have money for food and clothes, short on many other things | 0.12 | 0.06     | 0.27     | < 0.001 |
| We have most of the important things, but few luxury goods | 0.22 | 0.04     | 1.25     | 0.088   |
| Locality Type                                  |      |          |          |
| Urban Formal                                   | 1    |          |          |
| Urban Informal                                 | 0.31 | 0.05     | 1.95     | 0.213   |
| Tribal                                         | 0.42 | 0.08     | 2.29     | 0.314   |
| Rural Formal                                   | 2.17 | 0.40     | 11.71    | 0.367   |
| Number of sexual partners in the last 12 months|      |          |          |
| One partner                                    | 1    |          |          |
| Two or more partners                           | 20.42| 1.10     | 379.89   | 0.043   |
| Age mixing                                     |      |          |          |
| Partner five years and older                   | 1    |          |          |
| Partner five years younger                     | 0.10 | 0.01     | 0.94     | 0.044   |
| Partner within 5 years older or younger        | 0.35 | 0.13     | 0.91     | 0.032   |
other men [13]. This may be associated with psychological stress due to lack of marital partner commitment and/or partner attachment and sexual satisfaction [17, 18]. The main point is that the women in such relationships are often unhappy with their marriage life but are limited by social and economic conditions in which they find themselves. For these reasons, women are more likely to find ways to manoeuvre and strive for wellbeing within the confines of an unhappy marriage [19].

Limitations
The results have several limitations and should be carefully interpreted. The cross-sectional study design is limited to determining factors associated with polygamy and makes it difficult to infer causality. There may also be other unmeasured confounding factors, which have an effect on the association between polygamy and selected factors. Furthermore, the data collected were self-reports, which may be prone to social desirability bias. The analysis may have also been affected by non-response and/or missing data. The other limitation was the relatively limited number of women who responded to the question on polygamous marriages. The retrospective nature of the analysis is reflective rather than prospective. This means that generalization to the current population of women in polygamous relationships could not be made. Nevertheless, the results provide a basis for future research in this field in South Africa.

Conclusion
Polygamy is a social phenomenon that has existed for millennia and continues to transform itself in sub-Saharan Africa. The retrospective data presented in the current study revealed evidence of low levels of education, marriage to older male partners, and involvement in multiple sexual partnerships among women in polygamous marriages. More contemporary studies are needed on the impact of polygamy on women in light of increasing levels of modernization including changes in the socio-economic and demographic features of the South African society.

Availability of data and materials
The dataset used in the analysis is in the public domain, and can be accessed through the Human Sciences Research Council data research repository via access dataset http://curation.hsrc.ac.za/doi-10.14749-1400830395.

Authors’ contributions
LCS conceived the study and drafted the manuscript; MLHM performed the statistical analysis, interpretation of data and drafted the manuscript. NFM interpretation of data and drafted the manuscript. All authors read and approved the final manuscript.

Ethics approval and consent to participate
The research was approved by the Human Sciences Research Committee. The committee had Federal Wide Assurance (FWA) for the Protection of Human Subjects accreditation with the United States of America’s Department of Health and Human Services (DHHS). Written informed consent was obtained from all study participants.

Consent for publication
Not applicable, there are no personal details on individuals reported within the manuscript.

Competing interests
The authors declare that they have no competing interests.

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