

Full length research paper

# Caesarean section rates in large medical schemes in South Africa: An explorative descriptive study

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Caesarean deliveries are not funded by medical schemes unless clinically motivated by the provider. Although they are not covered by schemes, caesarean sections rates in the private sector are reported to be amongst the highest in the world, these procedures are also reported to be costly with an average cost of more than twenty five thousand rand per procedure. The objective of this study was to examine caesarean section rates in large medical schemes in South Africa; to explore selected factors that may be associated with these increasing rates. Multivariate analysis of variance (MANOVA) was conducted to measure CS rate characteristics to factors such as scheme type, pregnancy rates in schemes, the proportion of female beneficiaries in schemes, and the average age of beneficiaries. The average age of female beneficiaries in open schemes was higher than in restricted schemes at 33.3 years compared to 29.9 years ( $p=0.0180$ ). Open schemes offered more benefit options compared to restricted schemes: on average eight benefit options compared to three ( $p=0.0048$ ). The median caesarean rates per 1000 deliveries were 686.1 IQR (634.2–730.5). The data presented revealed that pregnancy rates, proportion of female beneficiaries in the schemes and the average age of beneficiaries had no effect on increasing caesarean rates. The findings of the current paper indicate that caesarean rates were relatively similar in open and restricted schemes, but consistently higher in open schemes. Selected covariates such as the average age of beneficiaries and pregnancy rates had no effect on the increasing caesarean section rates. Suggesting that other covariates such as clinical notes and provider perspective on CS rates need to be explored further, lastly, alternative initiatives to curb caesarean rates that have been explored in other countries could add value in South African medical schemes.

**Keywords:** Caesarean Section; Normal Vaginal Delivery; Prescribe Minimum Benefits

## INTRODUCTION

Caesarean deliveries are not funded by medical schemes<sup>1</sup> unless clinically motivated by the provider, yet despite this, caesarean section (CS) rates in the private sector are reported to be among the highest in the world, and caesarians are reported to be among the top 10 conditions that are costing schemes millions per year. There are various indications for elective caesareans; in South Africa, for example, the most frequent maternal motivation for an elective caesarean is HIV-positive status. This mode of delivery has reduces the rate of mother-to-child transmission of HIV (Segurado and

Paiva, 2007; Muula, 2007b). Literature reviewed on maternal and neonatal care suggests that outcomes of emergency caesarean section are not comparable to those of elective caesarean section (Muula, 2007; Olusanya and Solanke, 2009). Moyer et al. (2010) argue that even though caesarean section deliveries can be lifesaving for both mother and infant, their overuse is a cause for concern because of their association with increased maternal morbidity and mortality, cost, and the demands placed on scarce health-system resources. There are multiple factors associated with the increasing

caesarean rates, including whether such procedure is clinically appropriate or not (Stavrou et al, 2011). Commentators such as Matshidze et al. (1998), Cyr (2006) and Dhali et al. (2011) argue that there remains substantial evidence that caesarean section rates are also influenced by non-medical and potentially inappropriate factors. Other studies indicate that fear of litigation and a desire for safer deliveries are the primary reasons for conducting caesarean sections (Muula, 2008b). Health-care professionals in other settings perform this procedure routinely for perceived benefits of their own, listed below (Gibbons et al., 2010; Simpson and Thorman, 2005): Increased reimbursement, Reduced time taken in caring for the patient, Reduced likelihood of being sued. Apparent benefits to the patient of elective caesarean sections have also explored at length in literature, and these include: Controlling the specific date and time of childbirth, Maximizing maternity leave, There is subjective evidence that some women think that a CS is safer for the mother and/or child.

Some studies have contested the perception that CS is safer for the mother and/or infant, thus illustrating that this model of delivery does not necessarily improve the life quality of mothers (Huang et al., 2011). A study by Torkan et al. (2007) demonstrated that women undergoing normal vaginal deliveries (NVD) experience better quality of life post partum than those undergoing caesarean section. Torkan and colleagues further observe that some problems related to quality of life post caesarean section have not been given attention, including low back pain and perinatal pain. Another study by Toker et al (2009) showed that Caesarean section increases the risk of femur fractures ( $p < 0.001$ ) in neonates. Their study was approved by the Helsinki Subcommittee for trials in human subjects at Hadassah Medical Center (Research No. 2939), thus meeting the standard ethical procedures (Helsinki declaration).

The later reviews controvert that CS is harmless and contest some of the perceived benefits of a CS. Studies reviewed in this section provide important background information on elective caesarean sections and the importance of making patients aware of the risks involved in conducting such procedures.

### Key focus

Medical scheme members are entitled to certain Prescribed Minimum Benefits (PMBs) that the schemes are obliged to cover in full (South Africa, 1998). These include a maternity benefits package. Natural vaginal deliveries are normally covered by medical schemes; caesarean sections, however, are only covered if there are specific clinical reasons, such as the foetus being in distress or some other emergency. Despite this factor,

elective caesareans still dominate and are increasing in medical schemes.

### Rationale

Caesarean section rates in the private sector are estimated to be more than twice those in the public sector. These reported trends are significantly higher than international norms. There is scarce literature assessing whether caesarean sections do indeed improve quality of life for the privately insured population of South Africa. It is also noted that these procedures impact on hospitalisation costs.

### Objectives

The objective of this study was to examine recent data on caesarean sections performed on the medical schemes population, in particular that of large medical schemes. The current work seeks to assess factors associated with the increasing caesarean rates in the private sector. The objective is to recommend strategies that schemes can employ to curb increasing nonessential caesareans.

### Contribution to field

This study investigated factors associated with caesarean section rates in large medical schemes. Our study and preliminary data clearly show that CS rates are high in all medical schemes, and therefore need to be reduced. The factors we investigated, particularly the benefit options that medical schemes provide, appear to have no or little impact on CS rates. This finding suggests that alternative approaches, such as educating scheme members about the risks involved and employing rigorously managed care initiatives to control procedures that are not clinically motivated, are essential.

### Ethical considerations

The current study was not a clinical trial study, and therefore did not involve treatment or direct contact with patients. The data was assessed and reported only at a consolidated level for reasons of privacy and confidentiality.

## METHODS

### Materials

The data used were sourced from the statutory returns submissions that schemes submit annually. The data were captured on the annual statutory returns portal.

**Table 1:** Variables under investigation

Caesarean rates	Number of caesareans / 1000 deliveries
<b>Scheme type</b>	
<b>Open scheme</b>	Medical schemes that freely admit everyone
<b>Restricted schemes</b>	Employer group schemes, these schemes only admit applicants belonging to a specific employment sector.
<b>Scheme size</b>	
<b>Large</b>	Medical schemes that have more than 30 thousand beneficiaries <sup>2</sup> were classified as large schemes.
<b>Pregnancies rate per scheme (%)</b>	Number of pregnancies adjusting to all females in the scheme. The denominator in computing pregnancy rate excluded non-child bearing female age groups, < 10 years and > 50 years of age
<b>Female beneficiaries rate (%)</b>	Number of female beneficiaries in the scheme adjusting for all beneficiaries in the scheme
<b>Average age of beneficiaries (yrs)</b>	Average age of beneficiaries at scheme level

### Setting

Data included open and restricted schemes that were registered during the assessment period. The assessment period was data observed in 2011. The inclusion criteria were that schemes must be large and have submitted complete utilization data, and only female beneficiaries were considered.

### Design

The study was an explorative descriptive cross-section study that included 26 large medical schemes registered and operational in 2011. A purposive sampling frame was used to select beneficiaries to be included in the study. Purposive sampling techniques involve selecting certain units or cases "based on a specific purpose" rather than randomly (Tashakkori & Teddlie, 2003). For the purpose of this study we selected female beneficiaries of large schemes; large schemes were defined as schemes that have beneficiaries exceeding 30 thousand. The study was representative in terms of covered female lives. The study population consisted of 3.7 million female beneficiaries, which represented 82.2% (3.7/4.5) of all female beneficiaries. Benefit options design was represented by data from 149 benefit options 94 and 55 for open and restricted schemes respectively, which was approximately 48.7 % (149/306) of all benefit offerings in 2011.

### Procedure

The total number of caesarean sections in the 26 large schemes was extracted from the utilization section of the

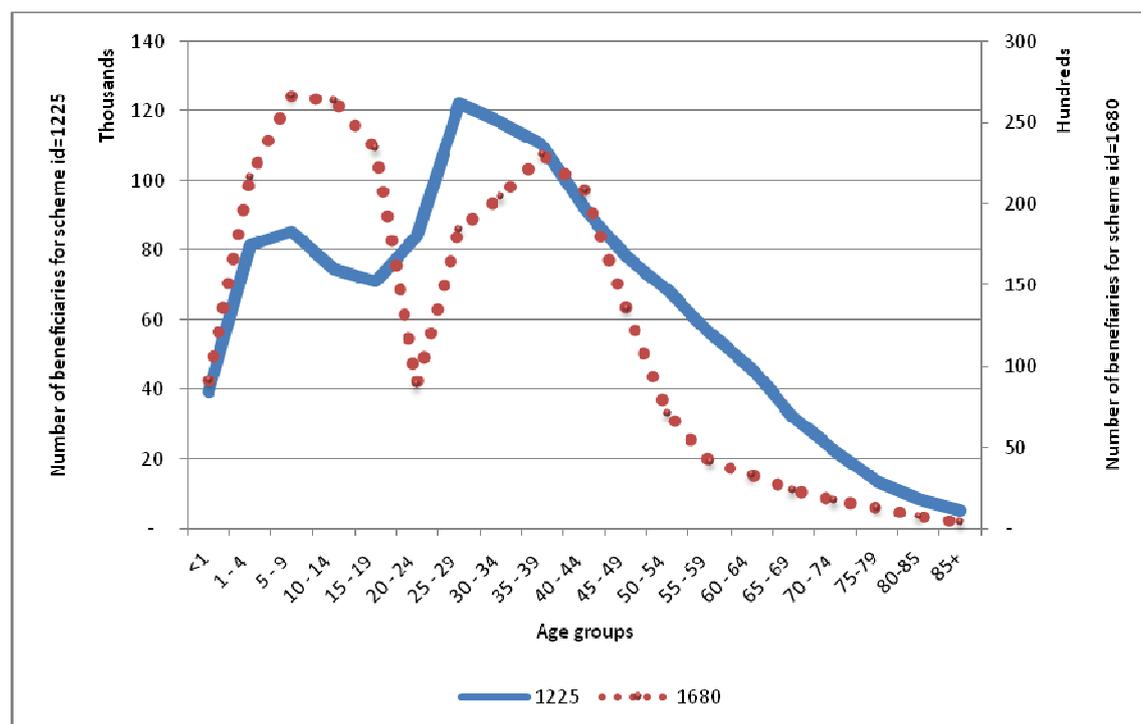
annual statutory return data submissions. This was then weighted to account for the number of female beneficiaries in each scheme. The average age of beneficiaries was computed at scheme level. Other covariates considered for predicting the proportion of female beneficiaries in schemes included the average number of pregnancies per scheme. Table 1 depicts the variables that were considered in the study.

### Statistical analysis

Descriptive statistics were calculated to describe the distribution of chronic disease in the sample population. Descriptive statistics such the medians and interquartile range (IQR) were reported to describe the data. Multivariate analysis of variance (MANOVA) was also conducted to measure CS rate characteristics to factors such as scheme type, pregnancy rates in schemes, the proportion of female beneficiaries in schemes, and the average age of beneficiaries (Hochberg et al, 1987; Westfall et al, 1999). We conducted all the analysis using SAS software, version 9.2 (SAS Institute Inc., Cary, NC). PROC GLM was conducted in SAS for the MANOVA analysis. Statistical significance tests were conducted at  $\alpha = 0.05$  significance level.

### RESULTS

The sample included 11 large open schemes and 15 large restricted schemes; these represented 84% of the private-sector female beneficiaries. The average age of beneficiaries included in the study was 31.8 years, slightly younger than the industry average of 32.4 years in 2011. The average age of female beneficiaries in open



**Figure 1:** Age distribution comparison for scheme id=1225 and scheme id=1680

schemes was higher than in restricted schemes at 33.3 compared to 29.9 years ( $p=0.018$ ). This phenomenon is illustrated in Figure 1, which shows the age distribution of a large open scheme and that of a large restricted scheme. The data from two schemes, an open scheme (scheme id=1225) and a restricted scheme (scheme id=1680), show dissimilar age profiles, with average ages of 32.3 and 25.5 years respectively. Open schemes also offered more benefit offerings than restricted schemes, on average eight benefit options compared to three ( $p=0.0048$ ). Within the open schemes' data, there was no correlation between caesarean rates, average age of beneficiaries and pregnancy rate; however a positive correlation was noted between average age and female rates in the scheme. Within the restricted schemes, there was no correlation between caesarean section rates, average age of beneficiaries and pregnancy rates. Figure 2 below depicts CS rates for open and restricted schemes; there were significant differences in CS rates between the two scheme types and quite a variation is observed in open schemes. The median caesarean rates per 1000 deliveries were 686.1 IQR (634.2–730.5) and for restricted schemes were 669.1: IQR (634.2–721.8). There were no significant differences in pregnancy rates and the proportion of females between the two scheme types. Findings of the multivariate analysis of variance (MANOVA) revealed that CS rate characteristics was not

significantly associated with scheme type, pregnancy rates in schemes, the proportion of female beneficiaries in schemes, and the average age of beneficiaries.

## DISCUSSIONS

There is a global trend for caesarean section rates to increase, and in South Africa, particularly in the private sector, recorded caesarean rates have been among the highest in the world. The objective of the current study was to assess and report on recent caesarean rates in medical schemes, in particular large medical schemes. By law, maternity benefits are part of PMBs and schemes need to cover these in full. Elective caesarean section is only covered if it is linked to clinical conditions or in emergencies. Despite the fact that this condition is not fully covered, continued increases are observed in schemes.

The results illustrate dissimilar demographic profiles between open and restricted schemes in terms of average age, which were younger in restricted schemes than in open schemes. Another finding which is also consistent with previous studies is that open schemes offered more benefits than restricted schemes (Willie, 2012). The effect of a benefit option is important as some schemes offer up 3 days and 4 nights others 4 days and

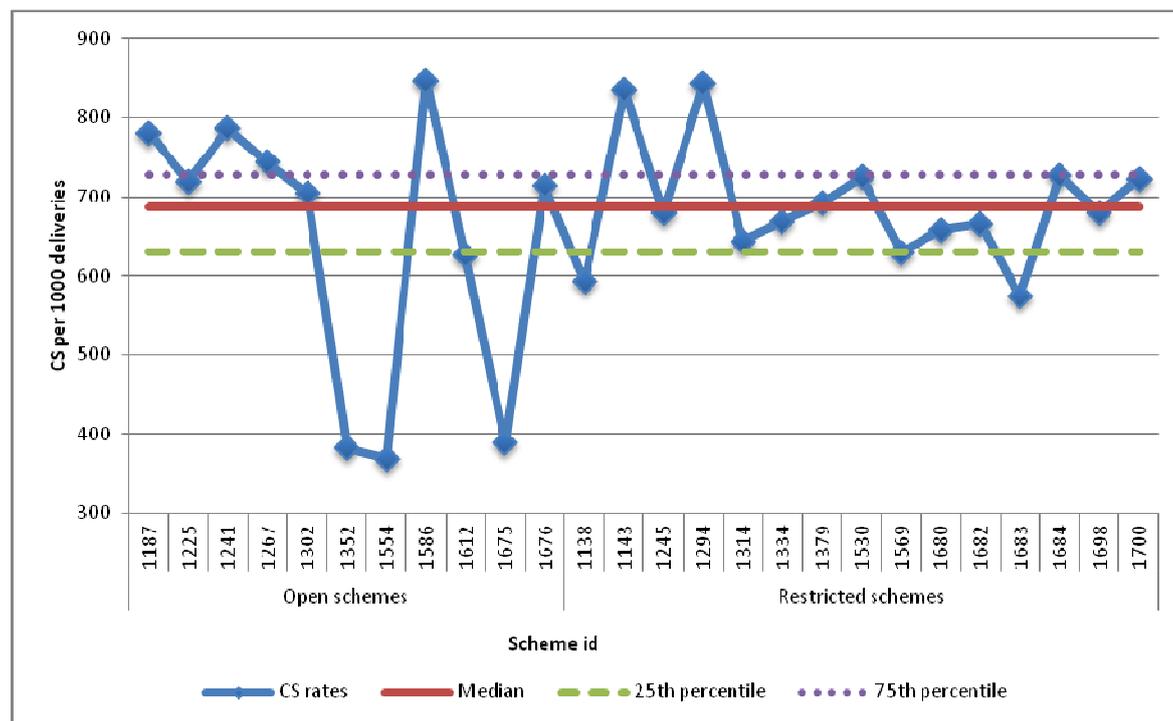


Figure 2: Caesarean rates for open and restricted schemes

5 nights for a caesarean section that medically necessary. The study did not find any significant association between the average age of beneficiaries and caesarean rates, although other studies have found a close association between maternal age and elective caesarean section (Bell et al, 2001; MacDorman et al., 2008). Tebeu et al. (2011) found that caesarean delivery is associated with extreme ages of reproductive life.

In the current study, we did not find any association between the average age of beneficiaries and the pregnancy rate. In the literature, Seng et al. (2005) found an association between age and fertility in older women: in women older than 40, pregnancy and live-birth rates fall, with a concurrent rise in miscarriage and cycle cancellation rates. According to a study conducted by Dunson et al. (2004), pregnancy rates also decrease steadily with increasing age of the woman.

The current study explored caesarean rates in both large open and restricted schemes. The median reported rates by all large schemes were 686.2: IQR (629.9–727.2). Caesarean rates between open and restricted schemes were not significantly different, but were consistently more than half of the deliveries in both sectors. Caesarean rates reported by schemes were not significantly associated with the percentage of female beneficiaries, benefit offerings or pregnancy rate. These results suggest that other covariates, including clinical

notes indicating the motivation for procedures, need to be incorporated in the model; also worth consideration are member and provider perspectives on caesarean rates.

### Limitations of the study

The current study was a descriptive explorative survey of reported caesarean sections in schemes during 2011. Because of the data limitations, no distinction was made between elective and non-elective rates. A more detailed study assessing trends over time in elective and non-elective procedures would certainly enhance the results of this study. In addition, a larger sample size in terms of medical schemes, including medium and small schemes, needs to be considered if the subject is to be explored further. Another limitation of the current study is that we only controlled to a select few set of covariates such as birth rates, pregnancy rates and average age of beneficiaries as reported by schemes; a more comprehensive study on other indicators clinically linked to caesarean section needs to be conducted. Data was analyzed at consolidated scheme level; an effect of benefit option design on cesarean rates could certainly enhance the findings of the current study. It is known that some schemes cover elective caesarean subject to scheme rules; the characteristics of benefit option design

are therefore pivotal for understanding CS rates in schemes. In recent years there has been a growing body of literature on the risks associated with caesarean section to both the mother and the child. With regard to assessing the quality life of the mother and child, a study is needed that looks at the patient perspective, such as a patient survey post caesarean section. Our study did not assess the extent of provider advice that a beneficiary should opt for a caesarean rather than NVD. Kiliç (2012) illustrated that majority of women had a caesarean delivery following provider advice. The author also concludes that higher caesarean rates may be due to provider indication that this procedure is routine, rather than objective medical criteria. In contrast, a study by Zhang et al. (2008) found maternal requests for CS to be a leading contributor to increased caesarean rates.

## Recommendations

The data presented revealed that pregnancy rates, proportion of female beneficiaries in the schemes and the average age of beneficiaries had no effect on increasing caesarean rates. Thus, revealing that other covariates need to be explored to further understand the increasing caesarian rates in the private sector. Though caesarean section is a preferred mode of delivery as attested by increasing rates, patients or beneficiaries still need to be informed of the risks involved. It is also recommended that beyond patient and staff education, managed care programs could be employed as an auditing tool to ensure that caesareans are clinically appropriate. Other initiatives that could be employed include making it mandatory to seek a second opinion and peer review before a caesarean is conducted (Muula, 2008a; Runmei et al., 2012). All such measures must of course take into account the fact that the patient has the right to choose their preferred mode of delivery.

Another contributing factor to increased caesarean rates that has been reported extensively in the literature is fear of litigation. It is therefore recommended that a reduction in litigation pressure would be likely to lead to a reduction in the number of caesarean sections carried out (Vincent et al., 1994; Yang et al., 2009; Kealey et al., 2010). Arjun (2008) further asserts that educating obstetricians, pediatricians and lawyers can have an effect in curbing rising caesarean rates.

## CONCLUSION

The current study enhances knowledge on caesarean section in the private sector, in particular amongst the largest medical schemes. Our study and preliminary data clearly show that CS rates are high in all large medical

schemes, and therefore need to be reduced. The factors we investigated, especially the benefit options that medical schemes provide, appear to have no or little impact on CS rates. This finding suggests that alternative approaches such as educating scheme members about the risks involved, and employing rigorous managed care initiatives to control procedures that are not clinically motivated, are essential.

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## Competing interests

The author declares that there are no financial or personal relationships which may give rise to a conflict of interest or otherwise impact inappropriately on the writing of this paper.

## Author's contributions

The author was involved in design and conduct of study; data collection; analysis and interpretation of data; and preparation and review of the manuscript.

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<sup>1</sup>Medical schemes are insurance institutions that cover medical expenses in South Africa. These institutions reimburse their members for actual expenditure on health.

<sup>2</sup> Beneficiaries included both principal members and dependents belonging to a scheme