Factors associated with caesarean sections among pregnant women admitted to a private academic hospital in Ongwediva, Oshana region, Namibia

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Abstract

Background. Caesarean section rates are increasing worldwide in both developed and developing countries becoming an issue of grave concern.

Objective. The aim of the study was to determine the factors associated with caesarean sections performed on pregnant women admitted to a private academic hospital in Ongwediva, Oshana region, Namibia.

Materials and Methods. A retrospective data approach was conducted on 200 patients' files using a self-administered checklist at a private academic hospital. A total of 200 records of mothers who underwent caesarean sections were systematically reviewed from January 2020 to December 2020 at a private academic hospital in Ongwediva, Namibia. A pretested structured checklist was used to record the data.

Results. The study revealed that 95.5% of women who had caesarean sections (C-section) were performed. A previous C-section was the most frequent indication, while 0.5% were performed due to patient requests. The p-value for the chi-square statistic was smaller than the standard alpha value ($P<0.05$), *i.e.*, there is a relationship between the demographic characteristics and factors associated with caesarean sections, as well as between socioeconomic factors and factors associated with caesarean sections.

Conclusions. This study shows that 95.5% of C-sections are done as a necessity with clear indications, while only 0.5% are done due to patient requests. This study's findings can be used to develop strategies and targeted interventions geared towards reducing the increasing rates of cesarean section considering maternal age, the number of indications of primary cesarean delivery, and following standard operating procedures that might improve the quality of prenatal and delivery care.

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Introduction

The term caesarean section (C-section) refers to the delivery of a fetus, placenta, and membranes through an abdominal and uterine incision after 28 weeks of gestation.[1] A C-section is carried out in obstetric emergencies where immediate action is necessary to prevent the deaths of the mother, unborn fetus, or both, and is usually carried out in incidences in which a vaginal delivery could endanger the health and/or the lives of fetus and/or mother.[2] There have been reports of increasing numbers of caesarean deliveries, which are due to, amongst other reasons, financial incentives, maternal requests, a lack of regulations, the safety of the operation, a decline in operative vaginal deliveries, and the identification of high-risk pregnancies.[3,4] C-sections can be done on an elective or emergency basis. An elective C-section is done at a pre-arranged time during pregnancy to ensure the best obstetric outcome, whereas an emergency C-section is done due to an acute obstetric emergency that risks the lives of the mother and/or child.[5,6]

In recent years, the rate of caesarean deliveries increased dramatically worldwide, exceeding the World Health Organization's (WHO) benchmark in many countries.[7] This rate varies from continent to continent, with Asia at 46%, followed by both Europe and Latin America at 33% and Sub-Saharan Africa at 6.2%.[8] The rise

in the number of C-sections performed has led to an upsurge in health service costs and the risk of maternal and perinatal morbidity and mortality.[9] While a C-section may play a vital role in providing care for pregnant women, there are potential complications.[10] In addition, women who undergo a C-section are likely to repeat this in a subsequent pregnancy, thus increasing the C-section rate in all countries with poor resources.[11] Moreover, there is ample evidence in the existing literature that there is increased maternal and neonatal morbidity and mortality associated with caesarean deliveries worldwide when compared to normal vaginal deliveries (NVD).[11] Infections, hemorrhaging, anaesthetic complications, bladder damage, prolonged hospitalization, and delayed recovery are common complications associated with a C-section.[12] A recent study identified that the risks of placenta previa, morbidly adherent placenta, and obstetric hemorrhage in subsequent pregnancies also increase in the case of repeated C-sections.[13]

The factors influencing a C-section are complex and differ from one continent to another. Barber *et al*.[14] conducted a study in the USA which identified factors such as the arrest of dilatation and non-reassuring fetal monitoring heart tracings as playing a significant role in the increasing C-section rates, as are medical conditions in the mother and/or fetus. A study conducted by Abebe, Gebeyehu, Kidane, and Eyassu on factors leading to C-section deliveries in Ethiopia identified that obstructed labor (30.7%),[15] fetal distress (15.9%), and abnormal presentation (13.4%) were the major obstetric indications of a C-section. In addition, factors such as maternal age and failure to progress in labor, as well as maternal request, play a role.[14]

The C-section rate between 2005 and 2010 was 13%,[16] which was in the WHO acceptable range (10-15%).[17] However, a study conducted by Shikwambi in the Khomas region in Namibia identified that the C-section rate had increased to 23.9%,[18] in 2014 with the proportion of non-elective C-sections being 72.2%. Shikwambi further highlighted that the main causes of C-section among low-risk women were poor assessment of maternal wellbeing and slow progress of labor.[18]

Materials and Methods

Study design and setting

The researcher utilized a non-experimental retrospective quantitative methodology, which used past information to identify possible cause/s for the research problem.[19] The maternity records were retrieved by the administrative personnel of the participating public health institutions using the admission numbers provided by the researcher. The research instrument was prepared in English and consisted of five sections, assessing the files of women who underwent caesarean sections at Ongwediva Medipark Academic Hospital in Oshana Region, Namibia. The following variables were assessed: demographics, institutional factors, obstetric history, medical factors, and socioeconomic factors. Data from the checklist were analyzed using the Statistical Package for Social Sciences version 26.0.

This Academic Private Hospital is a specialized, state-of-the-art private hospital that provides quality, accessible and affordable healthcare to the Namibian community and beyond. It has a capacity of 180 beds, two operating theatres, and a 24-hour emergency department.[20] The high numbers of C-sections are a matter of concern, however, as this leads to high healthcare costs, increased workloads, and challenges in ensuring the quality of care when compared to NVD, which is a natural way of delivery and linked to rapid recoveries, a relatively short hospital stay, and maternal satisfaction.[11] It is, thus, recommended that efforts should be made to reduce the use of C-section.[9] In developed countries, C-section rates have increased and attention is being focused on interventions to decrease its use.[10] By evaluating the frequency of C-sections in Ongwediva Medipark Academic Hospital, ways may be found to safely reduce the incidence of C-section in the population under study and improve the quality and efficiency of the care provided.

Study population, sampling, inclusion, and exclusion criteria

The study was conducted at a private academic hospital in the Oshana region, Namibia. The sample size was calculated using a margin of error of 0.005% and a 95% confidence level; 159 maternity records were sampled and 15% of non-responses were added. The final sample size was 200 maternity records. A systematic random sampling was used to select the maternity records from the sampling frame, *i.e.*, C-sections performed between January and December 2020. The first element was randomly chosen, after which every third element was selected until the required sample size of 200 was achieved. All files of the mothers who have undergone caesarean section at the private academic hospital Ongwediva, between January and December 2020. Files of mothers that deliver other forms of deliveries except C-section at the private academic hospital were excluded from the study.

Data collection

The data were collected by way of a structured checklist, which was developed from the latest obstetric literature regarding mothers who had gone through a C-section. The checklist was arranged systematically and consisted of six sections: biographic information, history of antenatal classes (ANC), morbidity during pregnancy, pregnancy problems, history of labor and postpartum data.

Data analysis

In this study, the data were analyzed numerically and described in simple terms for common understanding. Codes such as 1, 2, and 3 were used to categorize the data and entered into an Excel spreadsheet. The completeness and correctness of the data were checked and analyzed using Social Sciences Statistics Software IBM SPSS version 26.0. The services of a statistician were used, and the results are presented in frequency tables. To ensure the internal validity of the assessment tool in this study, the checklist was pretested to confirm whether it would meet the objectives of the study, with changes being made where necessary. The instrument was also presented to the research supervisor to evaluate the content validity. Furthermore, each item on the instrument was evaluated with regard to the degree to which the variable to be tested was represented, as well as the instrument's overall suitability for use. Finally, the instrument was pre-tested with five respondents who were similar to the sampled population. Cronbach's Alpha was used in this study, with a score of 0.711 signifying the consistency of the instrument.

Ethics approval and consent to participate

The study was granted ethics approval from the University of Namibia School of Nursing Research Ethics Committee (SoNREC) (Reference number: SoNREC 88/2020) and the Ministry of Health and Social Services Health Ethics Committee (Reference number VK2020). The participants gave their written informed consent after the researcher explained the study's aim, objectives, and methods but before they took part in the study. The

completed questionnaires were kept under lock and key, and the captured data was stored in a password-protected computer.

Results

Demographic characteristics of participants

According to Table 1, 22% of the respondents were aged between 20-30 years (n=44); 29% were between 41-50 years old (n=58); and 3.5% were above 50 (n=7). The largest group was 31-40 years at 45.5% of the respondents (n=90). The respondents who were 46-55kg accounted for 3.5% (n=7); those 56-70kg were 37% (n=74); those who were 71-90kg were 46% (n=92); and those who weighed above 90kg were 13.5% (n=21). The number of pregnancies a participant had carried was also obtained from the files, where those in primigravida were 27.5% (n=55); gravida 2-3 were

Table 1. Demographic characteristics of participants.

Demographic data		Count	Percentage
Age group	14-19	0	0%
	20-30	44	22%
	31-40	91	45.5%
	41-50	58	29%
	50 and above	7	3.5%
Weight class	30-45	0	0%
	46-55	7	3.5%
	56-70	74	37%
	71-90	92	46%
	91 and above	27	13.5%
Gravidity	Primigravida	55	27.5%
	Gravida 2-3	78	39%
	Gravida 4-5	57	28.5%
	Gravida 6+	10	5%
	Total	200	100%

Table 2. Institutional, obstetric factors and medical history of respondents.

Institutional factors		Count	Percentage
Institutional factors	Booked	162	81%
	Referral from other facilities	25	12.5%
	Self-request	13	6.5%
	Others	0	0%
Signed the consent for C-section	Patient self	200	100%
	Guardian/spouse	0	0%
	Medical Dr. in charge	0	0%
	Not signed	0	0%
First time this client is being attended at Medipark	Yes	113	56.5%
	No	87	43.5%
Was there a trial of vaginal delivery?	Yes	98	49%
	No	102	51%
If yes, what led to the conclusion for C-section?	None	102	51%
	Prolonged labour	18	9%
	CPD	28	14%
	Placenta previa	3	1.5%
	Obstetric request	0	0%
	Patient request	2	1%
	Others	47	23.5%
Obstetric history	**Count**	**Percentage**	
Antenatal care attendance	Attended	200	100%
	Not attended	0	0%
	Total	200	100%
Type of pregnancy	Singleton	187	93.5%
	Multiple	13	6.5%
	Total	200	100%
Gestational age when C-section was performed	Below 28 weeks	2	1%
	28-34 weeks	12	6%
	35-41 weeks	186	93%
	42 weeks and above	0	0%
	Total	200	100%
Any previous C-section?	Yes	49	24.5%
	No	151	75.5%
	Total	200	100%
Indication for C-section	Fetal distress	20	10%
	Previous caesarean section	52	26%
	CPD	28	14%
	Severe pre-eclampsia/eclampsia	10	5%
	PIH/pre-eclampsia	6	3%
	Malpresentation-breech/transverse	11	5.5%
	Prolonged labour	18	9%
	Failed vaginal birth after C-section	1	0.5%
	Cord prolapses	1	0.5%
	Others	53	26.5%

39% (n=78); gravida 4-5 were 28.5% (n=57); and gravida above 6 were 5% (n=10) (See Table 1).

Institutional, obstetric factors and medical history of respondents

Table 2 displays the institutional, obstetric, and medical factors of the respondents. Most of the respondents (81%) booked at Medipark (n=162), while 12.5% were referred from other facilities due to their well-equipped neonatal ICU and neonatologists (n=25). The remainder were self-requests 6.5% (n=13). All the patients signed a consent form themselves (100%). Over half (56.6%) of the respondents were assisted at Medipark for the first time (n=113). Of all the respondents, 49% tried delivering vaginally (n=98) but had a C-section because they had prolonged labor (9%), cephalo-pelvic disproportion (CPD) (14%), placenta previa (1.5%), requested one (1%), or had another reason such as breech, failed induction, fetal distress or pre-eclampsia (23.5%).

Table 2 also presents the obstetric history of the respondents. All the respondents had antenatal care, while 93.5% had multiple children (n=187); 6.5% had a single child (n=13). Just 1% of the respondents were less than 28 weeks when they had a C-section, 6% were 28-34 weeks and 93% were 35-41 weeks. Almost one-quarter (24.5%) of the participants had a previous C-section. The researcher identified that there were various indications for the C-sections, *i.e.*, 10% were due to fetal distress, 26% were due to a previous C-section, 14% were due to CPD (n=28), 5% were due to severe pre-eclampsia/eclampsia, 3% were due to pregnancy-induced hypertension/pre-eclampsia, 5.5% were due to malpresentation (breech/transverse), 9% were due to prolonged labor and 0.5% each were due to failed vaginal birth after C-section and cord prolapse. The majority of C-sections (26.5%) were due to other indications such as APH, multiples, DM, congenital abnormalities, macrosomic babies, failed inductions, edematous cervixes, IUGR, PPROM, and polyhydramnios. The study revealed that 36% of the respondents had pre-existing medical conditions (n=72). Of the 200 respondents, 19% had hypertension; 1.5% had diabetes mellitus; 15.5% had other pre-existing conditions (n=31) and 64% had no pre-existing medical conditions. Of the risk factors, 4% had elderly primigravida (40+), 20% had previously had abortions, 1.5% had previously had stillbirths and 1% had other risk factors. Most respondents (84.5%) had non-reactive HIV. Of the babies born, 8.5% were premature, 3.5% had transient tachypnea of the newborn, 1% were categorized as 'other' and most were normal (87%) (See Table 2).

Socioeconomic factors of respondents

Of the respondents, 37% were single and 63% were married. In terms of employment, most had a job (98%), while 16% were from a remote area, 34% were semi-rural and half were from a town (See Table 3).

Cross-tabulation between the demographic information, socioeconomic factors, and factors associated with C-sections

Table 4 illustrates Pearson's correlation between the demographic data and socioeconomic factors of the respondents, with variables on factors associated with C-sections among pregnant women. The results show that the p-values of all the variables were lower than the Alpha value of 0.05 for the relationship between the demographic information and the factors associated with C-sections. This means that the results were significant for these variables. The p-values for the socioeconomic factors were also smaller than the standard Alpha value, hence the null hypothesis which

Table 2. Institutional, obstetric factors and medical history of respondents.

Mother's medical related factors		Count	Percentage
Any pre-existing medical condition	Yes	72	36%
	No	128	64%
If yes, category?	None	128	64%
	Hypertension	38	19%
	Diabetes mellitus	3	1.5%
	Cardiac condition	0	0%
	Gynecological condition	0	0%
	Mental disorder	0	0%
	Others	31	15.5%
Any risk factors?	None	147	73.5%
	Teen pregnancy - 16 yrs.	0	0%
	Elderly primigravida 40 yrs.	8	4%
	Previous abortion	40	20%
	Previous still birth	3	1.5%
	Others	2	1%
Mother HIV status	Reactive	31	15.5%
	Non-reactive	169	84.5%
	Unknown	0	0%
Outcome of such C-section fetus	Prematurity	17	8.5%
	Normal live baby	174	87%
	Fresh still birth	0	0%
	TTN	7	3.5%
	Others	2	1%
Any complication after c-section	None	179	89.5%
	PPH	6	3%
	Anemia	3	1.5%
	Post-surgery infection or fever	1	0.5%
	Others	11	5.5%
	Total	200	100%

C-section, caesarean section; CPD, cephalo-pelvic disproportion; PIH, pregnancy-induced hypertension; TTN, transient tachypnea of the newborn; PPH, postpartum hemorrhage.

asserted that the variables were independent of each other was rejected. However, the association between the socioeconomic factor of marital status and the factors associated with the C-sections was not significant (P>0.05), except for the following institutional factors: first time being attended to at Medipark; trial of vaginal delivery; type of pregnancy; and outcome of such C-section (P<0.001) (See Table 4).

Discussion

This study revealed that the most common age for C-sections is 31 to 40 years old (45.5%, n=91), which is contrary to the findings of a study conducted by Rydahl, Declercq and Maimburg,[21] who reported that 25% of women who undergo C-sections are between 30 and 34 years. The findings of this study are similar to those of Janoudi, Kelly, Yasseen, Hamam, Moretti and Walker,[22] who discovered that women aged 35 or older experience a greater number of obstetrical complications than women aged between 20 and 34, with such complications putting them at risk of needing a C-section. The findings of this study also concur with a study by Nilsen, Østbye, Daltveit, Mmbaga and Sandøy,[23] who found that C-sections in higher maternal age groups are associated with medical conditions such as hypertension and diabetes. Moreover, in the industrialized world, social, demographic, and educational social trends, combined with the greater accessibility of birth control and more access to infertility treatments, have increased the proportion of women experiencing their first pregnancy after the age of 35.[24] However, emphasized that age is not, in itself, an indication for C-sections, but rather the occurrence of specific risks in this group may result in indications for C-sections, for example, women may have hypertension which could necessitate a C-section being performed.[25]

According to the Namibian Ministry of Health and Social Services (MoHSS) and the International Classification of Functioning Disability and Health,[26] the normal reproductive age is between 20 and 30 years, with this age range being considered to have the best delivery outcomes for both mother and fetus. This finding is similar to a study conducted at Al-Wahda Hospital in Libya, which found that the majority of women undergoing C-sections were in the 20 to 30-year age group.[27] Similar findings were reported in a study conducted by the Punjab Institute of Medical Sciences, which revealed that most of the mothers undergoing C-sections were between the ages of 21 and 30 years. On the other hand, a study conducted in a rural block of West Bengal found that the common age group of women who delivered by C-section had increased to between the ages of 25 and 30 years.[28]

In this study, the majority of the women were employed, indicating that they had a good socio-economic status. This study's finding is not in line with that of a study conducted by Shamshad in Pakistan in a public hospital, which identified that the majority of women who had undergone C-sections were unemployed and had poor socio-economic status.[29]

The majority of the women in this study had attended ANC. This finding concurs with that of Jabeen,[30] who found that most pregnant women who underwent a C-section had attended ANC. However, this finding was not supported by Paudel and Mehata, who discussed that C-sections among women who initiated ANC in the first trimester were low. The finding suggests that ANC initiated early (within 16 weeks) can have a positive impact on cae-

Table 3. Socioeconomic factors.

Socioeconomic factors		Count	Percentage
Marital status	Single	74	37%
	Married	126	63%
	Others	0	0%
Employment status	Employed	196	98%
	Unemployed	4	2%
Type of residence	Remote area	32	16%
	Semi-rural	68	34%
	Town	100	50%
	Total	200	100%

Table 4. Cross-tabulation between the demographic information, socioeconomic factors, and factors associated with C-sections.

	Age group	Weight class	Gravidity	Marital status	Employment status	Type of residence
Institutional factors	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
First time this client is being attended at Medipark	<0.001	<0.001	<0.001	<0.001	0.021	<0.001
Was there a trial of vaginal delivery?	<0.001	<0.001	<0.001	<0.001	0.048	<0.001
If yes, what led to the C-section?	<0.001	<0.001	<0.001	<0.001	0.561*	<0.001
Type of pregnancy	<0.001	<0.001	<0.001	0.004	<0.001	0.001
Gestational age when C-section was performed	<0.001	<0.001	<0.001	<0.001	0.858*	<0.001
Any previous C-section?	<0.001	<0.001	<0.001	<0.001	0.250*	<0.001
Indication for C-section	<0.001	<0.001	<0.001	<0.001	0.254*	<0.001
Any pre-existing medical condition	<0.001	<0.001	<0.001	<0.001	0.130*	<0.001
If yes, category?	<0.001	<0.001	<0.001	<0.001	0.513*	<0.001
Any risk factors	<0.001	<0.001	<0.001	<0.001	0.832*	<0.001
Mother's HIV status	<0.001	<0.001	<0.001	<0.001	0.387*	<0.001
Outcome of C-section	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Any complication after C-section	<0.001	<0.001	<0.001	<0.001	0.976*	<0.001

sarean section deliveries. In Namibia, a national policy of free maternal and child (less than five years) health care at public health facilities was implemented in 2000 in order to improve the accessibility and availability of maternal and child services throughout the country (MoHSS, 2013).[32] In addition, antenatal care service is rendered free of charge in all public health facilities (MOHSS, 2013).[32]

The indications for C-sections were divided into two categories: fetal and maternal conditions. The most common fetal condition reported in the study was fetal distress at 25.5%, which was lower than the 50% reported in a study conducted by Balmur & Guthi,[33] but higher than the 10% recently reported in an audit of C-sections carried out in Pakistan.[34] These variations may be attributed to the various methods used to detect fetal distress and the samples of the populations under investigation. In the hospital where this study was conducted, the most common method employed for monitoring fetal heart rate (FHR) in labor is cardiotocography. Nevertheless, despite the fact that there are guidelines on the diagnosis of fetal distress, in practice, what constitutes fetal distress may differ from one clinician to another based on inter and intra-observer differences in the interpretation of FHR patterns.

CPD, which is a condition where the fetal head is too large to fit through the maternal pelvis,[35] constituted 14% of the C-sections in this study. This finding concurs with a study conducted by Leitch and Walker,[36] who reported that the most common indication for primary caesarean delivery in nulliparous women is CPD. This is similar to a study conducted by Inyang-Otu,[37] who reported that obstetric factors occurring around birth, including obstetric labor (CPD), were the main reason that led to C-sections.

The findings of this study revealed that mothers with previous C-sections were more prone to having a subsequent C-section, as compared to their counterparts with no history of C-sections. These findings are similar to those of the study conducted by Shamshad,[29] who found that repeated C-sections were the most common indication for a C-section. This is also in line with a study conducted by Vieira, Fernandes, de Oliveira, Silva, and de Oliveira Vieira,[38] who reported that women who have one previous C-section face a markedly increased risk of a repeat caesarean section and feto-maternal complications in subsequent pregnancies. The MoHSS guidelines have established that women with previous C-sections should be given information during their antenatal visits to enable them to give their informed consent as to whether they wish to attempt a Vaginal Birth After Caesarean Delivery (VBAC) or proceed directly to a C-section. Those women who agree to a VBAC should be admitted at 38 weeks of gestation to wait for spontaneous labor, while those who do not agree should be booked for a C-section at around 38 weeks.[39]

Pregnancy-induced hypertension that develops into pre-eclampsia and then eclampsia was also reported as a major indication for caesarean sections. This is in line with a study conducted by Katz and colleagues,[40] who reported that mothers with high blood pressure during pregnancy are at a high risk of complications before, during, and after birth. Not only is the mother's health in danger, but the baby can be impacted by high blood pressure during pregnancy, which can affect the development of the placenta resulting in a limited supply of nutrients and oxygen to the baby, forcing a caesarean section. This was supported by Elzahaf and Ajroud,[27] who similarly found that women with hypertension are more likely to have a C-section than women with normal blood pressure.

One of the indications of caesarean sections reported in this study is mal-presentation. This finding concurs with that of Sharshiner *et al*.,[41] who noted that fetal mal-presentation is an important cause of the high caesarean delivery rates found across the world. This includes breech, face, brow, and compound presentations, as well as transverse lies. This was also supported by Chukwu, Ekeh, Haruna, Chi and Fiase,[42] who reported that fetal mal-presentation can sometimes be corrected by a doctor, but in some cases, it is safest to deliver via C-section.[42] agreed that it is one of the most common reasons for caesarean deliveries. This is also in line with a study conducted by Chaudhary, Raut and Pradhan,[43] who found that common indicators for primary caesarean deliveries are failure to progress (35.4%), non-reassuring fetal heart rate tracing (27.3%) and fetal mal-presentation (18.5%), although frequencies for each indication varied by parity.

Limitations of the study

This study had some limitations regarding the research instrument, as the questionnaire contained only close-ended questions. By implication, this meant participants would have limited response options. Additionally, the data source was a checklist of pregnant women who delivered through caesarean section at a selected hospital regarding their own perceptions, rather than direct observation or assessment of practices and knowledge. Participants may have interpreted questions differently when completing the questionnaires, thus the aim of the specific question may have been lost because of how it was interpreted. Due to financial resources, it was also not practically possible to conduct the study in all hospitals in the country. This limits generalization.

Conclusions

This study shows that 95.5% of C-sections are done as a necessity with clear indications, while only 0.5% are done due to patient requests. The most common indication for a C-section is malpresentation due to either a breech or transverse position, which is confirmed by a scan. This study's findings can be used to develop strategies and targeted interventions geared towards reducing the increasing rates of cesarean section considering maternal age, the number of indications of primary cesarean delivery and following standard operating procedures that might improve the quality of prenatal and delivery care.

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