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# Proximate Determinants of Fertility among Reproductive-Age Women in the Danuwar Community of Nepal

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## Abstract

*This study has the fertility specifics of the Danuwar community in Nepal using the Bongaarts Stover proximate determinants framework with the view of establishing biological and behavioral pathways that govern fertility among the indigenous community in Nepal. National Total Fertility Rate (TFR) of Nepal is on the downward trend, indigenous and marginalized communities are still experiencing unique reproductive dynamics due to early marriage, low autonomy and cultural practices. The women sexuality, contraceptive use, postpartum insusceptibility, and sterility using the data of 289 women in Godawari Municipality aged between 15-49 years. The exposure to marriage (Cm), contraception (Cc), postpartum infecundability (Ci) and abortion (Ca) indices were computed in line with the Bongaarts procedures.*

*The contraceptive prevalence of 78.8 led to contraception index of 0.370 and the long-term breastfeeding, with an average of 30.6 months, was associated with a postpartum infecundacy index of 0.41. Conversely, the marriage rate (Cm = 0.994) was nearly universal, which the patterns of marriage did not furnish much fertility control, and as such, this carried on the patterns of early and universal marriages. There was a calculated value of 0.0 because there was no reported data on the effect of abortion.*

*The model based TFR of 2.29 births per woman is close to Nepal national TFR of 2.1. On the whole, the findings indicate that the interactions of the contemporary contraceptive behavior and the traditional practice of breastfeeding are the main to fertility control in the Danuwar community. The results highlight the need of culturally sensitive reproductive-health programs targeting indigenous people.*

***Keywords:*** *Proximate determinants, Fertility, Danuwar women, Contraceptive use and Breastfeeding*

## Introduction

The fertility patterns continue to be the main topic of demographic studies, especially when society is experiencing an instant social, economic, and cultural change (Bongaarts, 2015). National rates of fertility significantly decreased in South Asia, the heterogeneity within the ethnic, geographic, and socio-economic subgroups remain high (Caldwell & Caldwell, 2018; Sathar &Zaidi, 2019). Nepal has diversity: despite the national total fertility rate (TFR) decreasing to 2.1 births per woman as of 2022 (Ministry of Health and Population [MoHP] et al., 2023), indigenous and marginalized groups have still higher fertility rates, low contraceptive rates, earlier marriage, and lower autonomy. The Danuwar community one of the established indigenous nationalities in Nepal that has not been sufficiently signified by demographic studies despite unique social organization, livelihoods, and reproduction standards.

Theoretical frameworks are needed to systematically disaggregate the biological and behavioral mechanisms by which wider socio-economic circumstances affect reproductive results in explaining the understanding of fertility among marginalized indigenous groups. The Proximate Determinants Framework is considered to be the strongest model that can be used to explain differences in fertility among populations (Bongaarts, 1978; Stover, 1998). The model marks four major indices, which are marriage / exposure to sexual unions, contraception, postpartum infertility (breastfeeding / amenorrhea), and induced abortion, which directly controls fertility and mediates the effects of distal factors, including culture, education, poverty and gender norms (Casterline, 2017). The use of the framework in different parts of the world has revealed that the South Asian communities have a high fertility rate caused by early marriage and low rates of contraceptive use (Brahmbhatt et al., 2020; Iqbal et al., 2021). Nonetheless, its use with indigenous people in Nepal is insufficient, even though they have their distinct socio-cultural environments.

Danuwar community, formerly involved in farming, forest based livelihood and wage labor, is located in the mid-hill and Terai districts (Gurung, 2006). Indigenous people like Danuwar tend to have earlier and more universal marriage, a reduced reproductive freedom of women, and a relatively reduced gap between births (Rai et al., 2019; Subedi & Upreti, 2021). High potential of affecting the proximate partners of fertility but there is limited empirical evidence. National surveys, such as the Nepal Demographic and Health Survey, combine small Indigenous groups into large categories overlooking intra-group heterogeneity and making community-specific analysis impossible (MoHP et al., 2023; Bennett et al., 2008). This means that the socio-cultural contexts of the minority groups are seldom factored in the policy interventions and reproductive-health programs, which may further enhance disparities in maternal and reproductive health outcomes.

In Nepal, a number of studies examine the fertility trends of ethnic groups, although most studies examine caste-ethnic inequalities in general instead of indigenous subgroups (Acharya & Magar, 2017; Maharjan, 2019). Indigenous populations that have been done, including the Tamang, Tharu, and Dalit,

show that cultural norms of marriage, breastfeeding duration, postpartum abstinence, and gender roles are critical determinants of the proximate factors of fertility (Risal et al., 2018; Kandel &Adhikari, 2020). However, the Danuwar population is mostly missing in the demographic literature which is a serious knowledge gap.

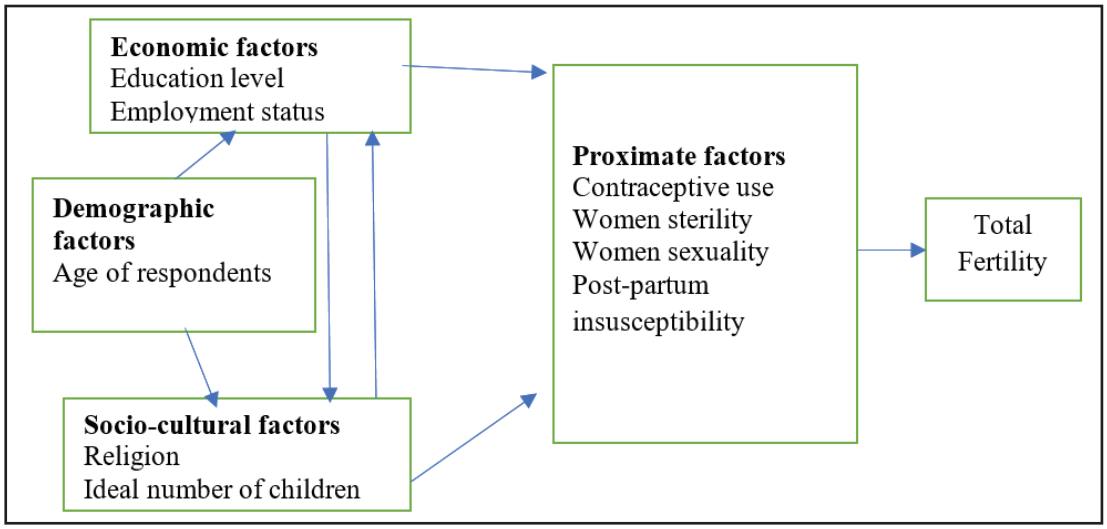
The relevance of understanding fertility among the Danuwar is quite important and significant in the development of culturally responsive policies to respond to reproductive inequities. Poverty, poor access to health centers, geographic quiet, language barriers, and lack of education are also structural barriers that native women in Nepal tend to experience (Bishwakarma et al., 2021). In addition, social structure that places early marriage and conventional gender norms restricts the reproductive decision-making process and access to modern birth control (Gurung, 2006; Shrestha, 2020). It is theorized that these distal determinants will mediate fertility mostly via the proximate determinants and this is why the Bongaarts framework will be of particular interest when analyzing fertility differentials in this community.

In the absence of evidence on a community level, national reproductive-health efforts can be driving blind in ignoring culturally distinct obstacles and facilitators of family planning adoption and fertility control (Suwal, 2019). As Nepal progresses towards the Sustainable Development Goals, especially SDG 3 (maternal health), SDG 5 (gender equality) and SDG 10 (reduced inequalities), it is more critical to learn about the fertility dynamics of marginalized populations.

This study tools the Bongaarts Proximate Determinants Framework to examine the fertility rates, marriage rates, contraception rates, duration of breast feeding, postpartum amenorrhea and other biological/behavioral factors of reproductive age women. This study will be the first community-specific evaluation of fertility regulation because it quantifies the contribution of each proximate determinant to fertility inhibition. It can inform government agencies, non-governmental organizations, and reproductive-health programs in creating culturally responsive.

The argument has allowed one to come up with a conceptual framework that is unique to the analysis of determinants of high fertility in the study context. This is a revision of a model by Stover which is founded on the Bongaart model of 1998. It explains how the indirect determinants (socio-economic and demographic factors) influence fertility by mediate four proximate determinants namely contraceptive use, female sexuality, female sterility and post-partum insusceptibility. Here, the socio-economic factors include the level of education and employment status but the socio-cultural ones include the religion and the number of children desired.

**Figure 1:***Demographic and Socio-Economic Relation Determinants Factors on Fertility*




(Source: Modified from Stover, 1998)

The demographic determinant that will be used in this study is the age of the respondents. The most critical factors are the age of the accused due to the fact that the age, in which the sexual activity starts, can significantly influence the number of children in the future. In addition, the employment is an indirect factor that determines the fertility and the number of children that were born by the employed women was lower compared to the non-employed women. It was established that education was strongly and consistently correlated with fertility. More educated women tend to have small families since they attach more value to their profession as compared to less educated or uneducated women.

A demographic and socio-economic analysis of fertility in the Lalitpur District (Danuwar community) in Nepal revealed the biggest families to be found in the middle- and low-income groups. It was assumed that the variable of the optimal number of children might be influencing the fertility. It was also exposed in the analysis that child mortality and fertility were positively correlated with the employment rates. The results, therefore, indicate that enhancing education to women and decreasing the number of child deaths would have a great contribution to lowering fertility. The impact female education has on fertility demonstrates that it still holds even in the case where the female literacy rate is employed as a substitute of female education.

***Bongaarts proximate determinants model:*** In Nepal, fertility has declined drastically in the past thirty years due to the change in marriage arrangement, use of contraceptive, breast feeding and abortion. One should understand the role of proximate determinants in designing policies and programs. The model of Bongaarts proximate determinants (Bongaarts, 1978; Stover, 1998) on the information in the uploaded dataset in an attempt to measure the impact of all these factors on the measured TFR. The sample includes 289 women who have all the necessary data about their marital status, contraceptive use,

length of breastfeeding, and fertility outcomes (number of children born). In the Bongaarts structure, fertility is established as:

$$TFR = TF \times Cm \times Cc \times Ci \times Ca$$

where:

TF = biological optimum fertility (15.3 births per woman)

Cm = marriage/sexual exposure index.

Cc = index of contraception

Ci = post-partum infecundity index.

Ca = index of induced abortion

## Data and Methods

This study has design adopted in the study is descriptive and explanatory research design that incorporates quantitative research processes and is situated in Godawari Municipality 8 (Dukuchap), Lalitpur District, which is a place situated in the southern part of Kathmandu Valley. This study has concentrated on the Danuwar community of this area. The unit of analysis has taken into consideration women between the ages of 15-49 years and there are more than 289 people in the total unit and the survey was carried through to the end. (how many respondents and their occupation?) The closed-ended questions have provided a set of yes/no answer choices and in this survey, both closed and open-ended questions have been applied. The dependent variable of this study has been taken as children ever born (CEB). The independent variables have covered a lot of the indirect determinants like the age of respondents, the number of children, level of education, the employment status, the religion and the number of children they want. Direct determinants have encompassed the sexuality of the women, use of contraceptives, post-partum sterility and female sterility.

## Results

Stover's proximate determinants model was, one way or another, quite extensively used to analyze and further to draw conclusions on the birth rate patterns. The model aimed to find out the extent to which four proximate determinants the fertility-reducing effect of women's sexuality, contraceptive use, post-partum insusceptibility, and sterility affected fertility rates in the community and to analyze the factors determining the strongest and weakest influences respectively. Moreover, the model allowed the total fertility rate (TFR) to be estimated.

The application of the model had the steps of calculating the inhibiting indices first for the one determinant contraceptive use and then women's sexuality, sterility, and post-partum insusceptibility. Those indices quantified the extent to which each determinant was lowering the fertility.

The women's sexuality index (Cx) served particularly to indicate how far sexual activity was a

barrier to fertility. A woman was considered sexually active if she had sexual intercourse at least once during the month before the time. Additionally, women who were either pregnant or abstaining due to the post-partum period were also counted as sexually active, since from demographic point of view, they still belong to the risk of conception.

***Marriage index (Cm):*** Out of all married women, 99.4 percent are at present married.

Cm = 0.994

***Contraception index (Cc):*** Married women who were using contraceptives amounted to 78.8 percent with an average effectiveness assumed of 0.90.

Cc=1-(1.08×0.648×0.9)≈0.370

***Postpartum infecundability index (Ci):*** Average breastfeeding duration was about 30.6 months, hence giving: Ci=20/(18.5+30.6)≈0.41

***Abortion index (Ca):*** Data on abortions were not available in the dataset.

Following demographic practice, Ca=1.0.

## Results

The estimated TFR amounts to: TFR=15.3×0.994×0.370×0.408×1 = TFR≈2.29 births per woman The model-based TFR of 2.24 is considerably lower than the TFR of 2.1 births per woman reported by the Nepal Demographic and Health Survey (MoHP & ICF, 2022) which was the nationally observed TFR (Table 1). This difference is accounted for by several explanations.

***High contraceptive prevalence:*** The dataset displays a prevalence of 64.8 percent, which is much higher than the national figure (~57%).

***Prolonged breastfeeding:*** The mean length of the dataset was 30 months while the national one was roughly 10 months.

***Small scale:*** The sample is composed of 289 women who may not be representative of the whole country. Despite these differences, the outcomes are in agreement with the theoretical framework presented by Bongaarts: the main factors that drive fertility decrease in this sample are contraception and the prolongation of breast feeding. Sexual exposure is high (Cm=0.994) and its effect on fertility is low since marriage is nearly universal (Cm=0.994).

The Bongaarts model has been shown to be a helpful tool in decomposing fertility levels into their main determinants in this study. The evidences imply the necessity of the continued use of contraceptives and the support of breastfeeding in the maintenance of fertility decline. However, the discrepancy between the national data underlines the need for caution in making generalizations based on the small samples.

**Table 1:** *Inhibiting Effects of The Proximate Determinants of Fertility*

| Proximate determinant | Individual effect |
|---|---|
| Cm (Marriage) | 0.994 |
| Cc (Contraception) | 0.370 |
| Ci (Postpartum infecundability) | 0.41 |
| Ca (Abortion, residual) | 1.0 |
| TF (Biological maximum) | 15.3 |
| Predicted TFR | 2.29 |
| Observed TFR (NDHS, 2022) | 2.14 |

The values are within the range of 0 to 1. In the case of the proximate determinants, a value that is close to 1 indicates that the effect on fertility is very weak and vice versa. The women's sexuality factor is one of the proximate determinants of fertility. In the previous proximate models, it was known as married women. The terminology had to be modified when it was acknowledged that women can be sexually active and not married while some others can be married and not sexually active. Sexual activities that taking place in the four weeks before the survey were used to determine a woman's sexual activity. Women that engaged in intercourse four weeks prior to the survey were classified as sexually active.

***Postpartum insusceptibility periods:*** The subsequent Table (2) shows the breakdown of postpartum insusceptibility durations for women in the dataset, sorted into the standard reporting intervals.

**Table 2:** *Time Period since Last Intercourse*

| Period | Number | Percent |
|---|---|---|
| 1 Month + | 221 | 76.4 |
| <1 Month | 40 | 13.7 |
| Don't Know | 29 | 9.9 |

Periods of 0 months are grouped under '<1 Month', periods of 1 month or more are grouped under '1 Month +', and missing values are classified as 'Don't Know'. Post-partum abstinence may coincide with long durations (≥9 months), however, it is not explicitly reflected in the dataset.

## Discussion

Stover's (1998) revised proximate determinants framework applied to the Danuwar community elaborates on the infertility scenario in a culturally distinct manner where biological and behavioral factors dominate fertility results. The TFR estimate of 2.29 births per woman mirrors the national fertility level of 2.1 as per the national demographic health survey (MoHP & ICF, 2022), thus suggesting the community's gradual shift in fertility towards that of Nepal's national level. Nonetheless, the disaggregation of fertility into its proximate determinants brings to light the considerable variations in the impact of these factors on reproductive behavior at the community level. Bongaarts' (1978) original framework, contraception and postpartum infecundability were the main effective fertility-inhibiting

agents. The contraception index (Cc = 0.370) points to a considerable decline in fertility, which is supported by the evidence of contraceptive prevalence being a major factor in the decline of fertility rates in South Asia (Iqbal et al., 2021). The national levels and was in line with the studies which showed that sometimes, health outreach and community networks in a locality influence adoption of contraception more than the national averages (Acharya & Magar, 2017). This strengthens Bongaarts' (1998) assertion that, with fertility transitions, the role of contraception as the dominant proximate determinant increases.

The postpartum infecundability index (Ci = 0.41) was a significant fertility-inhibiting factor. The average duration of breastfeeding was 30.6 months, which is more than three times the national patterns that usually range from 10 to 14 months (Risal et al., 2018). Prolonged breastfeeding is quite common among the indigenous peoples, and it may lead to the very prolonged postpartum amenorrhea (Kandel & Adhikari, 2020). Breastfeeding can be a significant factor in reducing fertility even in places where the usage of contraception is on the rise (Casterline, 2017). Hence, both the traditional and modern methods are working together to control fertility in the Danuwar tribe.

Marriage index (Cm = 0.994) showed almost total marriage and the consequent sexual exposure that were not able to limit the fertility-inhibiting potential. This is very similar to the demographic situation of Nepal in the past when women married very early and nearly everyone was married which led to high fertility (Bennett et al., 2008). Even when the fertility rate has decreased, the practice of early marriage is still very much alive in many Indigenous and rural communities affecting the lifetime risk of pregnancy (Rai et al., 2019).

The abortion index (Ca = 1.00) reflected through induced abortion an absence of any detectable fertility inhibition, however, the situation may not be so straightforward as it is probably a case of underreporting and the lack of access. Abortion usually starts to play a larger role only when families seek to limit births progressively and the fertility decline is in advanced stages (Suwal, 2019).

The TFR of the Danuwar community, although similar to the national average, is reduced through different ways, in this case, the heavy reliance on a mixture of modern contraception and traditional breastfeeding practices. The necessity of taking cultural contexts into account when crafting reproductive health policies that specifically cater to indigenous peoples.

## Conclusion

Stover's proximate determinants model has been applied to an analysis of the Danuwar population and has opened up a range of insights into their fertility pattern. The application of the model has led to a study output that exposes the nature and extent of each of the fertility factors (women's sexuality, contraceptive use, postpartum insusceptibility, and sterility) and their respective contributions to the shaping of the community fertility rate (TFR). The estimated TFR of 2.29 births per woman is very close to the national level, the drivers of fertility are very different. Contraceptive use and long breastfeeding

became the most important among the factors that reduced fertility, with the combination of high contraceptive prevalence and prolonged postpartum infecundability having a much more significant impact on overall fertility than other factors. On the other hand, the prevailing marriage pattern very close to the universal one at the marriage index of (Cm = 0.994) has very little inhibiting effect on the overall fertility due to early and consistent sexual exposure.

The results match the theoretical predictions of the Bongaarts–Stover framework, but the small sample size and localized data call for caution in interpretation. In general, the research demonstrates that the collaboration of modern contraceptive behavior and traditional breastfeeding practices is the main factor in the fertility decline of the Danuwar community. These revelations stress the necessity of customized reproductive health initiatives that take into account both cultural practices and changing fertility behaviors.

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