

# Projections of Urbanization in Nepal: The Replacement Dynamics Approach

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## Introduction

In demographic sense, urbanization is an increase in the proportion of the urban population to the total population over a period of time. The percentage of urban population is a coarse yet simple index of urbanization. Many other useful indices of urbanization are discussed in United Nations (1980).

Under the assumption that the intercensal difference between the urban and rural growth rates remain constant during the intercensal period, *Shrestha (1985)* considered only the proportion of urban population at the two ends of an intercensal duration to extrapolate into the future the most recently observed urban rural growth difference and the levels of urbanization of Nepal upto the year 2001.

In a recent paper, *Karmeshu (1984)* has carried out a comparative study of some demographic models of urbanization. He compared the conclusions about the evolutionary pattern of urbanization drawn from these models with the ones resulting from the "Replacement Dynamics" *Fisher and Pry (1971)* and has found that the United Nations model performs better in relation to other models. Further with appropriate changes in the parameters of the United Nations model, the pattern of urbanization derived from this modified model was seen to be the same as suggested by the Replacement Dynamics model.

The Replacement Dynamics model due to *Fisher and Pry (1971)* had its origin in describing the replacement process in the context of technological change and uses a logistic model to describe the pattern of replacement of one activity by another activity. This paper discusses such a model when the phenomenon of urbanization is viewed as a replacement process where the rural population is being replaced by the urban population, and uses the results based on replacement process for the purpose of projections of urbanization in Nepal.

## The Model

Let  $U(t)$  and  $R(t)$  denote the urban and rural population at time  $t$  and let  $f(t)$  and

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$1-f(t)$  denote the fraction of the population in urban and rural sectors respectively. Then

$$(1) \quad \begin{aligned} f(t) &= U(t)/(U(t) + R(t)) \\ 1-f(t) &= R(t)/(U(t) + R(t)) \end{aligned}$$

Following *Fisher and Pry (1971)* the graph between  $\ln f(t)/(1-f(t))$  and time  $t$  is a straight line so that

$$(2) \quad \ln \frac{f(t)}{1-f(t)} = \ln \frac{f(0)}{1-f(0)} + a t,$$

where  $a > 0$  is the constant replacement rate. Using (1), (2) may be written as

$$(3) \quad \ln \frac{U(t)}{R(t)} = \ln \frac{U(0)}{R(0)} + a t,$$

which describes the evolutionary pattern resulting from the Replacement Dynamics.

#### The Data

This study uses the following data from the population censuses of 1952-54, 1961, 1971 and 1981 on the total urban and rural population of the country.

Table 1  
Distribution of Urban and Rural Population of Nepal for the Census Years 1952/64-1981

Year	Population		
	Total	Urban	Rural
1952/54	8,256,625	235,892	8,020,733
1961	9,412,996	336,222	9,076,774
1971	11,555,983	461,938	11,094,045
1981	15,022,839	956,721	14,066,118

Source: Intercensal Changes of Some Key Census Variables, Nepal, 1952/54-81, Table 5.2 and 5.4, pp.63 and 65, *Central Bureau of Statistics, H.M.G.*, 1985.

#### The Results

For computational convenience, the census year 1952/54 is taken as 1952 only. The pattern of urbanization for Nepal over the period 1952-1981 is depicted in Fig. 1. The fit may be seen to be extremely good. Assuming that this trend of urbanization will continue, the straight line fit may be employed to project the urbanization. The projected levels of urbanization  $f(t)$  for the period 1986-2001 are reported in the following table.

Table 2  
Projected Levels of Urbanization in Nepal, 1986-2001

Year	Level of Urbanization
1986	0.0641
1991	0.0719
1996	0.0807
2001	0.0904

It was pointed out by *Karmeshu (1984)* that the evolution of urbanization based on the Replacement Dynamics shows a tendency to total urbanization in the long run, which is a questionable tendency in reality. However, the fitted curves are usually cut off above  $f(t) = 95$  percent or so as the prediction starts becoming unreliable. We note from Table 2 that in 2001,  $f(t)$  reaches only 9.04 percent - a value much below 95 percent. Moreover, the levels of urbanization obtained in this paper for the years 1991 and 2001 are comparable to those obtained in *Shrestha (1985)* where exponential growth of proportion urbanized was assumed. It is, therefore, expected that the projected levels of urbanization may not be in much error.

#### References

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