DEMOGRAPHIC AND SOCIOECONOMIC DETERMINANTS OF CONTRACEPTIVE USE AMONG URBAN WOMEN IN THE MELANESIAN COUNTRIES IN THE SOUTH PACIFIC: A CASE STUDY OF PORT VILA TOWN IN VANUATU

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Foreword

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I. Introduction

Demographic issues in the South Pacific developing member countries (SPDMCs) of the Asian Development Bank (ADB) were not of major concern until very recently. Small populations, which were scattered among various remote islands and net migration over several decades to the metropolitan countries, gave rise to a feeling that the issues of farm land availability, environmental degradation, deforestation, rapid urban growth, and rising unemployment among the youth were of concern only to large countries such as the People's Republic of China and India (Gannicott 1993). Recognition of population issues came about only in the early 1990s, when the subject of slow or near negligible growth of the Pacific island economies, despite substantial transfer of resources through bilateral grants and concessional lending by multilateral financing institutions, came under close scrutiny of the World Bank (1991, 1993) and the Asian Development Bank (1993).

Among various reasons identified for poor rates of growth were weak absorptive capabilities and high rate of population growth of about 2.2 per cent per annum on average for all SPDMCs. In the current context of resource constraints and declining trend in external aid to SPDMCs, a high population growth rate has caused considerable concern as it would adversely affect in the long run, allocation of expenditures to human resource development, including education and training for skills formation.

The annual rates of natural population growth are high in all SPDMCs reflecting declining mortality, with 2.2 per cent and 2.9 per cent in the two Polynesian countries of Tonga and Western Samoa, respectively, and 3.5 per cent and 2.9 per cent in the two Melanesian countries of Solomon Islands and Vanuatu. In the case of the Polynesian countries, due to steady annual migration to Australia and New Zealand in the past and increasing migration in recent years to North America, the annual population growth rate has been negligible. On the other hand, because of near absence of out-migration of the population in the two Melanesian countries, the annual population growth rates in the Solomon Islands and Vanuatu have remained high and equal to natural growth rates. It is feared that in case there are changes in the policies of the metropolitan countries with regard to migration, the relatively stagnant population in the two Polynesian countries would also dramatically increase.

In view of the rising population levels threatening the prospects of sustainable development in the South Pacific, the governments of SPDMCs have given high priority to consideration of issues relating to effects of rapid population growth on provision of services. Due to strong influences of religion as well as community leaders such as chiefs in Vanuatu and the Solomon Islands and *matais* in Western Samoa, including traditions in the South Pacific, the subject of fertility control through use of contraceptives continues to remain a taboo in public discussions. However, indirect recognition of the mother and child welfare aspects of family health programs has led to increased use of contraceptives in recent years, especially in the urban areas of SPDMCs. Although part of the reason for contraceptive usage can be ascribed to the fact that the growing urban population in newly emerging towns is far more receptive to modern influences generated through tourism and related service sector activities, the unique traditional and cultural influences still play a significant role.

The objective of this paper is to analyze various factors determining the use of contraceptives among the married women of reproductive age living in the urban areas in the Melanesian countries. The analysis relies upon the findings of the survey of women in Port Vila, the capital of Vanuatu, undertaken over a period of three months in the first half of 1994. The paper is organized into four sections. The first section delineates the past demographic trends of Vanuatu as well as Port Vila, and future projections. The second section provides a literature survey on the subject of fertility control and determinants of contraceptives in developing countries. The third section briefly outlines the methodology employed, which was used for analyzing the data collected and discusses the survey findings. The last section presents some conclusions and implications of significance for Bank operations.

II. Trends in Population Growth and Projections

A. Population Growth During 1979-1989

Vanuatu's population grew to about 142,00 at an average rate of 2.8 per cent per year during the decennial census period 1979-1989, as compared with 3.1 per cent during 1969-1979 (Republic of Vanuatu 1991). Although the total fertility rate (TFR) has declined from 6.5 in 1979 to 5.3 in 1989, the crude birth rate has remained high at 38 births per thousand population. The crude death rate decreased from 12 per thousand in 1979 to 9 per thousand in 1989, accompanied by a decline in infant mortality from 94 per thousand births in 1979 to 45 per thousand in 1989. The annual population growth rate is estimated at 2.9 per cent (Table 1). The high TFR has been observed to be due to health status, cultural beliefs, and perceived economic security with large families (South Pacific Commission 1994). According to the 1989 census, the national contraceptive prevalence rate (CPR) is about 15 per cent.

TABLE 1
Vanuatu: Population Trends, 1967-1989

	1967	1979	1989
Population:	105,00	111,251	142,630
Percent Urban	10.0	14.4	18.4
Population Density	8.8	9.4	12.0
Annual Population Growth Rate (%)	n.a.	3.1	2.9
Infant Mortality Rate (per '000)	123	94	45
Total Fertility Rate	6.7	6.5	5.3
Life Expectancy at Birth Year			
Males	51.0	56.2	61.5
Females	51.0	53.7	64.0

Source: Republic of Vanuatu, National Statistics Office (1991).

B. Population Projections

As part of a major research study for alerting the agencies concerned in regard to design and delivery of developmental assistance, the National Center for Development Studies of the Australian National University has made population projections under different scenarios (Cole 1993). These are under three sets of assumptions: (i) high variant of constant TFR of 5.3 throughout the next 20-year period under the current CPR of 15 per cent, combined with rising life expectancy for males from 61.5 in 1994 to 66 in year 2014, and for females from 64 in 1994 to 69 in year 2014; (ii) medium variant of TFR of 5.3 falling steadily to 4.3 in year 2014, combined with the life expectancy for males and females as in (i) above; and (iii) low variant of TFR of 5.3 falling more rapidly than in (ii) to 3.3 in 2014 combined with the same assumption regarding life expectancy for males and females as in (i) and (ii) above.

Table 2 presents the projections. According to these projections, the population under the first scenario will grow at 2.97 per cent during 1989-94 and thereafter the growth rate would rise and reach 3.10 per cent during 2010-2014. Under the second set of assumptions, the rate of growth of population will be 2.55 per cent during 2010-2014, and under the third set of assumptions it will be 1.95 per cent. The population under the first two sets of assumptions will more than double in 2014 and almost double under the last set of assumptions (Arif 1993).

TABLE 2

Vanuatu: Population Projections

	1994	1999	2004	2009	2014
I. High Variant (Constant TFR of 5.3)	161,800	188,170	219,300	255,880	298,730
Growth Rate (%)	2.97	3.02	3.06	3.09	3.10
II. Medium (Slow Declining TFR to 4.3 in 2010)	161,800	187,000	215,420	247,270	280,860
Growth Rate (%)	2.97	2.90	2.83	2.76	2.55
III. Low Variant (Rapidly Declining TFR to 3.3 in 2010)	161,800	186,420	212,110	238,440	262,840
Growth Rate (%)	2.97	2.83	2.58	2.34	1.95

Source: Arif (1993).

C. Urban Population

Nearly 80 per cent of the population live in rural areas and outside the two urban towns of Port Vila on Efate island, and Luganville on Santo island. During 1979 and 1989, Port Vila and Luganville experienced annual net migration rates of 1.4 per cent and 3.1 per cent, respectively. Fertility in both towns is lower than the national level (Republic of Vanuatu 1991). Under the assumption of Port Vila's TFR of 4.5 as compared to the national TFR of 5.3 and an increasing net migration rate from the current level of 1.4 per cent per year to 2.0 per cent per year in 2019-2014, urban population has been projected to increase almost threefold in 2014 (Table 3).

TABLE 3
Projection of Port Vila Population : 1989-2014

	1989	1994	1997	2004	2009	2014
High Variant	16,830	21,750	27,470	33,790	40,990	49,620
Per Cent of Total Population	12	13.6	14.8	15.8	16.6	17.4
Medium Variant	16,830	21,630	26,840	32,320	38,280	44,870
Per Cent of Total Population	12	13.5	14.5	15.4	16	16.6

Source: Arif (1993).

D. Implications of Population Increase

Implications of rapid increase in population in DMCs have been documented (Asian Development Bank 1993). Accordingly, there will be considerable pressures on the already weak budgetary provisions of the government with regard to financial allocation for priority sectors of human resource development (HRD), including education and health, both in regard to investment requirements and operation and maintenance expenditures (Jayaraman 1993b). Projections indicate that the school age population could increase by 77 per cent by 2009. Presently, only around 70 per cent of the 6-14 age group is enrolled in full-time education and a little more than 20 per cent of year-6 leavers are enrolled in junior secondary school. In these circumstances, Vanuatu has a formidable task of trying to extend provision of education to an increasing proportion of the age group as part of capacity building toward greater HRD efforts, at a time when the age group itself is increasing (Asian Development Bank 1993, Gannicott 1993).

As regards employment, the size of the labor force is likely to double in 2014. Although most of the economically active population will probably be involved in the non-wage sector including agriculture, young people entering the labor force who would have completed at least junior secondary school would demand greater opportunities in the wage sector (Arif 1993). This would mean rapid urban development, manifested in squatter settlements, inadequate sanitation, and severe pressure on the pristine waters of the Port Vila lagoons, which are a major tourist attraction (Gannicott 1993). Environmental degradation would ultimately affect the prospects of the tourism industry, which has been relied upon as a major engine of growth in the light of its current contribution of about 30 per cent to the country's gross domestic product (Jayaraman 1993a).

Sufficient foresight is needed to plan ahead for undertaking investment decisions in critical areas. These will include provision of adequate infrastructure in terms of urban water supply, sanitation, and waste management. Interisland transport and communication facilities should also be provided to achieve more balanced regional development and disperse the population through the generation of income-creating activities in the remotest islands. These investments are expected to alleviate gloomy prospects to a great extent.[1]

[1]The ongoing Project Preparatory Technical Assistance (PPTA) (TA No:1952) for preparing a feasibility study for Urban Infrastructure Projects, approved on 13 September 1993 for $536,000, is expected to be completed and lead to a loan project for approval in 1995. Another PPTA in 1995 is included in the country program's pipeline for Transport Infrastructure Project involving preparation of a project feasibility study for wharfage facilities and construction of hinterland roads in the outer islands, likewise aiming for approval of a loan in 1996.

E. Population Policy

Until 1992, Vanuatu's attitude toward population growth and its implications on development can best be described as benign. The Second National Plan (1987-1991) document took a stand that there was "at the moment no particularly urgent problem related to growth, size, structure, and movement of population" (Republic of Vanuatu 1988). The apparent sense of complacency was due to the fact that at an overall population density of 12 people per square kilometer, Vanuatu was considered to be lightly settled (Asian Development Bank 1993). It is therefore no surprise that during the last two decades, as observed with regard to the rest of the world, the approach of the government of Vanuatu and international aid agencies to population implications was one that might be characterized as *population-accommodating rather than population-influencing*. Public sector expenditures and external aid were all directed toward provision of additional services in terms of increased infrastructure facilities for rural water supply and health and education, in order to accommodate more people.

Recognition of these problems, which are likely to be posed in the long run by the continued rapid population growth in relation to rural-urban migration, unemployment among youth, housing, education, and health care, came about only after the publication of the Main Report of the Vanuatu National Population Census 1989 (Republic of Vanuatu 1991). The census figures and projections provoked the planners to take a hard look at the facts and as a result, there was a radical shift in policy which was duly reflected in the Third National Plan (1992-1996). The plan document declared that reduction in number of births is "the only viable policy measure on a national level" (Republic of Vanuatu 1992).

It seemed obvious that, as observed by former ADB President Kimimasa Tarumizu (1993) in his Keynote Address during the *Bank Symposium on Population Policy and Economic Development: Lessons of Experience*, equilibrium could be more easily achieved if attention was paid to both demand and supply sides and that *population-influencing* policy should be more vigorously pursued to complement the economic policies addressing the supply constraints in the economy. Following the declared statement of a deliberate policy in favor of reduced number of births, the government established in late 1993, the Vanuatu Population Board to formulate guidelines on population policy.[2]

F. Family Health and Child Care Services

Way before the need for deliberate reduction in number of births was officially declared in 1992, the Department of Health had been providing family planning services in the government-run hospital in Port Vila. Nationally speaking, about 15 per cent of married women of relevant age (15–49) have had access to family health advisory services. However, these service facilities are of a low-profile nature, mainly because of sensitivities attached to contraceptive use in a deeply religious country. Further, the traditional values propagated by the communal living system and the pervasive control over the population by village chiefs were very much against the use of family planning services.

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[2] Under Bank Technical Assistance (TA No: 2259) for Preparation of Population Policy and Action Plan approved on 23 December 1994, consulting services are being provided to assist the Board in this regard.

There has been evidence of family planning practices in the past as documented by a recent study (UNICEF and Republic of Vanuatu, 1986) that husbands and wives were abstaining from sex when children were breastfeeding or until children could walk. These and other traditional practices have fallen into disuse in recent times, without being replaced by modern methods of birth control. It has been well recognized that while modern methods are available, especially after a campaign against AIDS has been initiated, clear information with regard to other long-term options such as sterilization is still not widely available. Further, it has been observed that choices of methods adopted have not been adequate and the men, in particular, are not sufficiently involved in family planning education.

G. Women and Family Planning

In Vanuatu, as is the case in Melanesia, traditional values require women to play a subservient role to men who are considered as warriors and diplomats. The economic status of women is rather low as they have had limited opportunities for education and hence employment, other than in subsistence agriculture and retail trading in vegetables and processed goods in the weekly markets, besides the usual domestic chores and child rearing. Despite the continuing traditional values enforced by traditional custom chiefs and the strong influence of the church in Port Vila, where women account for 34 per cent of paid employment, the Vanuatu National Council of Women (VNCW), an umbrella organization for nonofficial women's groups has been playing a major role in propagation of family health and child care advice. As part of these activities, advice on contraceptives and their use is given in private discussions, indicating that the subject of open propagation still remains as a religious taboo. In its efforts in this area, a volunteer group known as the Vanuatu Family Health Association (VFHA), with funds still flowing in an indirect manner with apparent approval of the authorities from the International Planned Parenthood Federation of London, has also been active. Efforts of VFHA, however, are confined only to Port Vila.

The Office of Women's Affairs (OWA) in the Ministry of Justice, Culture and Religion under the Deputy Prime Minister has a mandate to promote increased participation of women in development (WID) and incorporate WID concerns in all development programs and projects. As part of its overall mandate, family health and mother and child care programs are also implemented in Port Vila and outer islands. These include family welfare and child care advice and counseling. A review of OWA's functions and resources under Bank technical assistance has indicated that inadequate financial resources and lack of trained personnel for counseling services have been adversely affecting the full discharge of mandated responsibilities.[3]

[3] The recommendations made by the report which was submitted in August 1994 to the government under Bank Technical Assistance (TA No: 2026) for Strengthening the Office of Women's Affairs are under consideration by the government.

III. A Literature Survey

A. Demographic Transition

The well-documented literature (Gilis, Perkins, Roemer, and Snodgrass 1992) on demographic trends shows that the first stage of the demographic transition is marked by a decline in the death rate due to improved health conditions and control over the known killer-epidemics of last centuries, such as small pox, plague, and cholera. The question of reduction of the population in developing countries thus narrows down to a matter of decreasing the birth rate. Three kinds of demographic change affect the crude birth rate: (i) Change in the population shares of different age groups and sexes: A rise in the share of the people of reproductive age (15 to 49) increases the birth rate and conversely, if the proportion of the old people in the population goes up as in the developed countries, the birth rate drops. (ii) Change in the share of people of reproductive age who are married: This is affected by the proportion who marry at some time in their lives, by the average age of first marriage, and by the divorce rate. (iii) Marital fertility or the rate at which couples reproduce: Historical birth rate declines have been due to decline in marital fertility.

B. Basic Conditions for Fertility Decline

There are three basic preconditions for fertility decline: (i) couples should be free to make a conscious choice about the number of children they should have and such choice should be socially acceptable; (ii) couples should perceive social and economic benefits from having fewer children; and (iii) couples should have access to information on contraceptives and effective techniques and contraceptives should be available and agreeable for use with them (Teitelbaum 1977). Among these three conditions, the primary force working for lower birth rates is perceived incentives for couples to have fewer children, while the other two conditions act only as facilitating forces.

C. Theories of Fertility

Fertility is determined by a combination of complex forces. In traditional societies, having many children is the social norm and a woman's principally recognized function is to bear and rear children. Rationality considerations in human choice would accordingly justify having a large number of children. Consistent with rational choice, Caldwell (1976) puts forward a theory of modernization influencing fertility control. According to him, extended family relationships in traditional societies facilitate inter-generational wealth transfers from younger to older generations, which explains large families. In modernized societies, nuclear families become common and economic ties between generations get weakened; as a result, the transfer process reverses. It is the parents who have to transfer resources to children and they would prefer to have fewer children.

Even in traditional societies children impose costs and benefits. The costs include both monetary and economic (opportunity) costs. The benefits are economic and psychic. Rearing children imposes expenditures on food, clothing, shelter, and education. Implicit costs are loss of earning opportunities for mothers, who have to look after children.

The benefits of children arise from their contributions to supplement family incomes. In traditional societies, young children help parents on their farms and in household enterprises. In poor families with no landed property or assets of any kind, they work for wages outside homes and bring in money. Children also provide a form of social security to parents in their old age in developing countries which do not have any institutional arrangements for providing old age social security benefits. In view of high infant and child mortality rates in developing countries, parents are motivated to give birth to children until the desired number of children are born. In societies where a male child is treasured more than a female child, fertility rate is expected to be higher until the male child is born.

Based on the foregoing, child bearing as an economic decision has the following aspects which have been empirically tested with conclusive evidence : (i) fertility rate would be higher if children at a young age are looked upon as contributors to family incomes; (ii) lower infant mortality would lower fertility rate since fewer births would be required for reaching the desired number of children; (iii) establishing an institutionalized system of old age social security system would reduce fertility rates; and (iv) fertility would fall when increased job opportunities outside the home are available to women, which are incompatible with childbearing (Gilis et.al. 1992).

D. Increase in Income and Population Growth

As regards impact of economic development in terms of higher per capita incomes on fertility rate, one may hypothesize that fertility should be higher when family incomes are higher as economic costs could be easily borne. Empirical evidence is however, to the contrary. Fertility has been observed to be inversely related to income and this negative relationship shows up in both time-series and cross-section data analyses: fertility is generally higher in poor countries than in rich countries and in most societies middle-income and upper-income families have less number of children than poor families.

Becker (1981) offers an economic explanation by constructing a theoretical model of household economics. In his model where tastes are regarded as given, children are "consumer goods" and each household maximizes a joint utility function in which goods they can buy are: (i) children; (ii) "child quality", which is a vector of characteristics including education and health; and (iii) conventional goods and services. The constraints faced by the households are: (i) parents' time and (ii) the cost of purchased goods and services. According to Becker, there is a fall in fertility as income rises over time since the cost of children tends to increase and especially the opportunity cost of parents' time increases. Given the rising cost of rearing children, parents opt to invest in quality and spend more on fewer children.

Easterlin (1983), however, gives recognition to the role of tastes in decision making and explains falling fertility as the combined effect of changing tastes and declining cost of fertility control. He argues that motivation to fertility control is determined by the following factors: (i) demand for children, defined as the number of children if fertility regulation is costless which is essentially a matter of tastes; (ii) natural fertility, which is determined by biology and partly by culture; and (iii) cost of fertility control, which includes market costs of contraceptives and psychic costs of social disapproval of particular fertility limitation practices. Thus, change in tastes toward small families and decreasing costs of birth control contribute to lower fertility.

E. Collaborative Approach Versus Coercion

Changes in tastes of lasting nature are better brought about in an evolutionary manner through economic development than by coercion. Sen (1994) distinguishes the voluntary choice and collaborative approach from the coercive and overriding approach by an outside agency. In the latter case, an outside agency, typically the government, either on its own or under pressure from donors, adopts compulsory sterilization as was attempted in India in 1975. Or, it penalizes by denial of housing, medical, and education facilities to families with a large number of children, as followed in the People's Republic of China besides its "one child policy", which "overrides" family's personal choice and decision. The override approach might produce quick results in the short run but would have lasting effects of distrust in and animosity against authoritarian decision making for replacing voluntary choice by families. It would also ultimately destroy the very foundations of a free society. Further, economically and socially, the overriding approach will have disastrous results in the long run as it would result in a notable decline in investment in education and health, as misplaced trust is placed on coercion, neglecting the critical areas of development. Sen persuasively argues that education and health care, on the other hand, have a significant part in the voluntary reduction of the birth rate.

Quoting Condorcet, whose diagnosis of the possibility of population was borrowed but whose advocacy of enlightenment reasoning was rejected by Malthus (1798), Sen (1994) states the "collaborative" approach which relies not on legal or economic restrictions but on rational decisions of men and women, based on expanded choices and enhanced security and encouraged by open dialogue and extensive public discussions, would solve the problem of over-population. This would be achieved by reasoned human action through: (i) increases in productivity; (ii) better conservation and preservation of waste; and (iii) education, especially female education, which would contribute to reduction in birth rate. Modern social scientists including Piel (1992) have eloquently supported such a collaborative approach in which both governments and citizens would together produce economic and social conditions favoring slower population growth.

F. Empowerment of Women

Referring to the claim of the many feminist and conservative groups that population control programs violate women's human rights and ignore their health and other needs, Mason (1994) stresses the need to put pressures on governments to improve the quality of population control programs so that these programs enhance rather than restrict women's freedom of choice. She also emphasizes the need to empower women in a variety of social and economic spheres, by ensuring that they receive adequate education and are free from physical abuse within the family. A vital step in empowerment of women is giving them the means to control their own fertility.

Deprivation of women of their freedom to rational choice in many third world countries is primarily due to lack of educational opportunities and lack of self-reliance. This is compounded by absence of, or inadequacy of employment opportunities, resulting in perpetual dependency on the husband as sole earner. Sen (1994) points out that there is a close connection between women's well-being and their power to make decisions and bring about changes in the fertility pattern. Empowerment of women

through improvement of their status and enhancement of their ability as a result of greater economic opportunities and political activity would eventually lower birth rate (Dreze and Sen 1994).

G. Empirical Evidence

Empirical investigations have conclusively shown that economic development under collaborative and voluntary choice conditions which have (i) fostered economic security and affluence; (ii) promoted wider availability of contraceptive methods; (iii) expanded female education, in particular; and (iv) improved mother's health and child care which led to declining mortality rates have contributed to substantial reduction in birth rates in different parts of the world (Easterlin 1980, Birdsall 1988, King and Hill 1992, Cassen et. al. 1994). Referring to these empirical findings, the World Bank (1994) has documented that population growth rate has fallen from 2.2 per cent per year between 1970 and 1980 to 1.7 per cent between 1980 and 1992 and has forecast that this rate is expected to go steadily down until the size of the world population becomes nearly stationary.

Viewed against the foregoing theoretical background which is supported by empirical findings of Easterlin (1980) in recent years, a study of determinants of use of contraceptives has to focus on essentially an analysis of both direct and indirect conditions governing supply and demand factors.

H. Supply and Demand Factors

Use or non-use of contraceptives is determined by supply and demand. Forces behind supply are influenced by the availability of contraceptives and institutional factors, which have been described as "factors internal to population programs" (Lapham and Mauldin 1985). These institutional factors are categorized into two: policy and stage setting activities, and service and service-related activities. The first category includes: (i) government's official family planning policy; (ii) policy on legal age at marriage; (iii) laws permitting import of contraceptives; (iv) involvement of government agencies; and (v) budgetary support. The service and service-related activities refer to: (i) promotion through mass media for information, education and communication (IEC); and (ii) provision of counseling and visits by health workers.

Regardless of supply conditions, "demand factors have an effect independent of family planning programs" (Birdsall 1985). Demand for contraceptive use, choosing a specific method in particular, is primarily determined by the strength of desire to space or limit family size. Such desires are influenced by both socio-demographic and socio-economic factors, which are broadly covered under a framework of four dimensions proposed by Bulatao (1989).

I. Framework of Four Dimensions

The four dimensions are: (i) contraceptive goals (spacing or limitation of children); (ii) contraceptive competence (ability to use methods effectively); (iii) contraceptive evaluation (assessment of moral and practical aspects of using a specific method); and (iv) contraceptive access (including geographic, economic, and other

aspects of accessibility). The first dimension, referred to as contraceptive goals, comprises demographic variables. The second dimension, contraceptive competence, relates to education of both husband and wife. The third dimension of contraceptive evaluation refers to religious beliefs and ethnicity aspects of the contraceptive user. The last dimension relating to accessibility is with regard to economic factors, such as income levels and employment status.

J. Demographic Factors

The demographic factors influencing use or non-use are: (i) age; (ii) age at marriage; (iii) marital duration; and (iv) number of living children. It is hypothesized that the higher the age, the longer the marital duration, and the larger the number of children, the higher is the probability of use of contraceptives among the married women of reproductive age (15-49). On the other hand, the probability of use of contraceptives is likely to be low among women who have married later. This is attributed to urgency in reproductive behavior, particularly at lower parities.

K. Socioeconomic Factors

Among the socioeconomic factors covered under Bulatao's last dimension, education in terms of years of formal education, employment status, and income levels of both the woman and her husband are of major importance. Child loss is considered as one of the economic factors on the grounds of perceived economic security in old age. Comprehension and practicability of different methods of contraceptives are promoted by counseling advice and visits of family planning workers. In societies where women are relatively independent due to both cultural factors and higher education levels as well as better economic status, women have a greater say in decision making. In addition, presence of critical factors determining IEC aspects of promotion of family health programs are availability of electricity in the house and access to radio and television.

L. Findings of Empirical Studies on Use of Contraceptives in DMCs

A major proportion of empirical studies on the use of contraceptives refers to South Asian experiences and increasingly, although still relatively small at the present stage, to the People's Republic of China. Findings of some of the important studies may be of interest. A recent update of an 1987 survey on the use of contraceptives in Sri Lanka confirms the earlier finding that both demographic and socioeconomic factors were important in distinguishing users from non-users: those using some type of contraceptive method were urban, Sinhalese, and better educated. Secondly, there was an almost total lack of differentials among users of temporary modern and traditional methods. This is related to the third feature, which is the relative dependence of method choice on family life-cycle goals rather than on sociocultural differentials: the use of sterilization is closely associated with the goal of terminating childbearing, while temporary methods of either type are being used for child spacing (Malhotra and Thapa 1991).

A study using the results of the 1989 Bangladesh Fertility Survey highlighted the importance of women's education and women's participation on family planning decision making, which influenced the current use of contraception. The study also brought out the following relationships: (i) desire for additional children, visits of family planning workers, husband's occupation, and urban residence were positively related to use of contraception; (ii) child loss was inversely related with the current use of contraception; and (iii) sex composition of living children in favor of male children significantly influenced decision (Ullah and Chakraborty 1993).

In a study on contraceptive use in Jamshedpur, an industrial town in east India, which has a mix of all religious and caste groups, migrant workers from almost all states in India with different mother tongues and hence representing varying cultural patterns of India, showed that religion and caste were important determinants. Among other factors, wife's education was a significant determinant, positively associated with current use of contraception. The use of contraception was also found positively related to marital duration, number of children, especially number of sons among living children (Bhende et. al. 1989)

A study on Nepal's contraceptive use noted that desire for more children was inversely related to use of family planning methods; and knowledge about various methods was positively associated with the use of contraception (Amatya 1988). A speculative analysis of socioeconomic influences on the fertility transition in the People's Republic of China (Cheng 1991) emphasizes the importance of the following factors responsible for decline in fertility: growth of education, changes in occupational opportunities, rise in status of women, changes in the costs and benefits of children, housing shortages in urban areas, land shortages in the rural areas, changes in family and marriage system, rising age at marriage, increasing proportion of women entering into late marriage, and decline in infant mortality.

IV. Case Study of Vanuatu

A. Vanuatu's Population Policy and Bank Typology

The Bank's *Population Policy Paper: A Framework for Bank Assistance to the Population Sector* (1994) has discussed in detail the criteria employed for describing four broad types of DMCs in the Asian and Pacific region. These are: (i) socioeconomic setting, which may either be supportive of or antagonistic to creating demand for family planning and services, including improved health and education status of women and children; (ii) population policy framework, embodying expressed political commitment and the setting of demographic targets; (iii) institutional arrangements for strategic management and stimulation of consumer demand for contraceptive materials and methods; (v) delivery of quality services, which have several aspects including needs assessment through a client-centered approach, access to contraceptives and counseling services, and systematic follow-up with reference to monitoring of safety of methods; (vi) community-based efforts to link services to demand and perceived needs; and (vii) role of the private sector and user charges for cost recovery.

In the light of the aforementioned criteria, it may be observed that in Vanuatu, population planning has not yet become a salient issue. Further, its IEC is undeveloped, with poor access to contraception and counseling and inadequate management support. Furthermore, there is no clear role enunciated by the government for the private sector and all the current family planning activities have been left to nongovernmental organizations (NGOs). For these reasons, one can conclude that Vanuatu's population policy and stage setting activities can be regarded as relatively weak and its services and service-related activities inadequate. Hence, by applying the Bank's criteria prescribed for categorization of DMCs, Vanuatu would be labeled as Type 2, falling under the description: "a country with some concern for population planning but exerts minimal effort" (Asian Development Bank 1994).

B. Applicability of Four Dimensions to Vanuatu

Despite the handicaps listed above, the four dimensions of Bulatao are eminently applicable to a study of use of contraceptives in Vanuatu. However, in the context of the country's cultural and religious backgrounds, only three of the four dimensions can be utilized in identifying various factors influencing contraceptive use. Since religious influences are strong and there has been an ongoing but muffled debate on the subject, this particular dimension was deliberately left out of consideration.

C. Data for Empirical Study

Ideally speaking, the data for the empirical study should be drawn from a household survey and the households should be selected on a random sampling basis. Unfortunately such a household survey was advised against by the authorities on the grounds that a household survey might give rise to an impression that it was officially sponsored and might receive adverse publicity and be halted midstream. In the context of strong influence of church groups and custom chiefs, and since the subject of use of contraceptives was considered highly sensitive, a discreet and low-keyed questionnaire method was suggested. Accordingly, the survey questionnaire was carefully worded (Appendix 1). Women gathering at public places including weekly markets and other places were interviewed randomly and information was gathered on a purely voluntary basis.

The information, which was collected during a three-month period from June to September 1994 from married *ni* Vanuatu women of 15-49 years, referred to fertility behavior, knowledge and practice of contraception, availability of contraceptives, and accessibility to contraceptives. Details regarding demographic characteristics, such as education, respondent's and husband's present age, marital duration, number of living children, child loss, and desire to have additional children were also collected. Socioeconomic factors related to employment status of wife and husband, income of family, availability of electricity in the home, and access to radio and television.

Out of a total number of 304 respondent-women, 171 (56 per cent) reported that they were current users of contraceptives. Only six women reported they had undergone sterilization. The rest of the current users were on pills. None of the respondents was adopting traditional methods. There was no case of vasectomy operation undergone by spouses, although use of condoms by husbands in certain cases was mentioned in conjunction with use of pills by women.

Table 4 presents the list of variables employed in the empirical analysis together with their respective definition and whether they are categorical with dichotomous values (0 or 1) or have numerical values. The use of contraceptives is treated as a dichotomous variable, with a value of 0 in case the respondent reports no use, or 1 in case the respondent currently uses any method. The independent explanatory variables refer to demographic factors, including present age (X_1), duration of marriage (X_2), number of living children (X_3), loss of children (X_4), and desire to have more children (X_5). The variables X_1 to X_3 have numerical values and X_4 and X_5 are dichotomous variables. X_4 would assume the value of 0, if there was a child loss and the value of 1, if there was no such child loss. X_5 would assume the value of 1 if the respondent expressed no desire for additional children, and the value of 0 if the answer was in the affirmative.

As regards socioeconomic variables, education of wife (X_6) and husband (X_7) in terms of years are numerical variables. Occupation of wife (X_8) and husband (X_9) are dichotomous variables. Variable X_8 would take the value of 0, if the respondent was a housewife and 1 if she was employed. Similarly, X_9 would assume the value of 0 if the husband was unemployed and 1 if he was employed. Family income (X_{10}) is a numerical variable in terms of monthly earnings in thousands of vatu.

TABLE 4
Definition of Dependent and Independent Variables

Variables	Category	Value	Mean	Standard Deviation	Expected Signs of the Coefficient[a]
Dependent					
Current use of contraception	User = 1 Non-user = 0	-	0.56	0.49	
Independent					
Present Age (X_1)	-	Number of Years	29.88	5.76	?
Duration of Marriage (X_2)	-	Number of Years	9.32	5.30	?
Living Children (X_3)	-	Number of Children	3.16	1.53	+
Child Loss (X_4)	Yes=0, No=1	Number of Children	0.74	0.44	+
Desire to have more Children (X_5)	Yes=0, No=1	-	0.67	0.90	+
Education of wife (X_6)	-	Number of Years	7.03	2.37	+
Education of husband (X_7)	-	Number of Years	7.30	2.86	+
Occupation of wife (X_8)	Housewife = 0 Employed = 1	-	0.61	0.49	+
Occupation of husband (X_9)	Unemployed = 0 Employed = 1	-	0.81	0.39	+
Family Income per month (X_{10})	-	Vatu in Thousand	35.23	27.79	+
Electricity in Home (X_{11})	Yes=1, No=0	-	0.68	0.46	+
Radio in Home (X_{12})	Yes=1, No=0	-	0.86	0.35	+
TV in Home (X_{13})	Yes=1, No=0	-	0.30	0.46	+
Visit of Family Planning Workers (X_{14})	Yes=1, No=0	-	0.39	0.49	+

[a] See page 17 on the hypothesized relationship between the independent explanatory variables and the dependent variables.

All the remaining variables are dichotomous variables. Variable X_{11} assumes the value of 1, if the respondent's home had electricity and a value of 0 if none. Variables X_{12} to X_{14} relate to IEC. If the respondent had access to radio and TV, X_{12} and X_{13} would respectively take the values of 1 and in their absence the two variables would assume the value of 0. Finally, the variable X_{14} represents the home visits of family planning workers

from VFHA. If the respondent said that she had the benefit of such visits, the variable assumed the value of 1 and 0 if otherwise.

E. Bivariate Analysis

Although 56 per cent of the respondent-women were current users of contraceptives, there were significant variations in use with different demographic and socioeconomic characteristics. Each of the 14 variables (X_1 to X_{14}) was tested with reference to its distributional influence on the two dichotomous groups of users and non-users. In other words, the objective of the test was to find out whether observed differences between the two proportions of current users and non-users to total number of respondents with respect to each characteristic were due to chance or due to the relevant variable's significant distributional influence. The test adopted was the Chi-square test (Appendix 2).

Table 5 shows the results of Chi-square tests of significance on observed differences in the two proportions of users and non-users with reference to distribution of respondents among categories under each variable. Distributional influences of each of the following variables which were statistically found to have had significant influence on the observed differences in the user and non-user proportions are: present age, child loss, wife's education, occupation of wife, occupation of husband, family income, availability of electricity, access to radio and TV, and visits of family planning workers. The significance level was at one percent in regard to all these variables, whereas for the radio variable, significance was at 5 per cent level. On the other hand, the distributional influences of the following variables are found not significant: marital duration, number of living children, desire to have more children, and husband's education.

F. Multivariate Analysis: A Logit Model

For analysis of the influences of all independent explanatory variables on the probability of contraceptive use, we now resort to multivariate analysis. The logistic regression model, which derives its name from the logistic probability function (Gujarati 1988), expresses the qualitative dependent variable, which in our present study is dichotomous, as a function of several independent variables, both qualitative and quantitative (Fox 1984). The logistic regression model employed for analysis is:

$$ln\ (p/1\text{-}p) = b_0 + b_1X_1 + b_2X_2 + \ldots\ldots + b_{14}X_{14}$$

where

p is the probability of using any method of contraception;
ln is the natural logarithmic function;
$b_1 \ldots\ldots b_{14}$ are regression coefficients; and
$X_1 \ldots\ldots X_{14}$ are the explanatory variables.

TABLE 5

Current Users and Non-Users of Contraceptives by Demographic and Socioeconomic Characteristics

Characteristics	Respondents	Per cent	Users	Non-Users	Per cent of Users	Per cent of Non-Users	Chi-square	Degrees of Freedom
Total	304	100	171	133	56	44		
Present Age of Respondents								
0-5 years	4	1	4	-	100	-		
21-30 years	175	58	92	83	53	47	12.49[a]	3
31-40 years	110	36	71	39	65	35		
41-50 years	15	5	4	11	27	73		
Marital Duration								
0-5 years	121	40	73	48	60	40		
6-10 years	86	28	46	40	53	47		
11-15 years	71	23	40	31	56	44	4.58	4
16-20 years	15	5	9	6	60	40		
Above 21 yrs	11	3	3	8	27	73		
Living Children								
No Children	9	3	7	2	78	22		
1-2	141	46	71	70	50	50	5.32	3
3-4	92	31	53	39	58	42		
5 and above	62	20	40	22	65	35		
Child Loss								
Yes	79	26	16	63	20	80	55.38[a]	1
No	225	74	155	70	69	31		
Desire more Children								
Yes	118	39	69	49	58	42	0.4	1
No	186	61	102	84	55	45		
Wife's Education								
0-5 years	103	34	42	61	40	60		
6-9 years	127	42	68	59	54	46	32.27[a]	2
Above 10 years	74	24	61	13	82	18		
Husband's Education								
0-5 years	91	30	46	45	51	49		
6-9 years	115	38	68	47	59	41	1.84	2
Above 10 years	98	32	57	41	58	42		
Wife's Occupation								
Housewife	122	40	43	79	35	65		
Employed	182	60	128	54	70	30	15.91[a]	1
Husband's Occupation								
Unemployed	65	21	20	45	31	69		
Employed	239	79	151	88	63	37	23.04[a]	1
Family Income per month								
0-15 thousand	104	34	31	73	30	70		
16-49 thousand	109	36	75	34	69	31	44.28[a]	3
50-99 thousand	71	23	52	19	73	27		
Above 100,000	20	7	13	7	65	35		
Electricity								
Yes	208	68	139	69	67	33		
No	96	32	32	64	33	67	30.79[a]	1
Radio								
Yes	262	86	154	108	59	41	5.52[b]	1
No	42	14	17	25	40	60		
Television								
Yes	92	30	67	25	73	27		
No	212	70	104	108	49	51	14.24[a]	1
Visit by Family Planning Workers								
Yes	120	39	117	3	98	2		
No	184	61	54	130	29	71	137.24[a]	1

[a] significant at 5 per cent level
[b] significant at 10 per cent level

Source: Author's calculations.

Since p is the probability of using a contraceptive and $(1-p)$ is the probability of not using it, the ratio $p/(1-p)$, known as the odds ratio, is simply the odds in favor of using a contraceptive. The natural log of the odds ratio is called the logit and therefore, the model is called the logit model (Appendix 2). The logit model tells us that the log of the odds ratio is a linear function of explanatory variables, which are in the present case both demographic and socioeconomic variables (X_1 to X_{14}), as defined above. The slope of the coefficient, for example, b_1 gives the change in the log of the odds ratio per unit of change in X_1. The logit model does not give the probabilities directly and the computing procedure is illustrated in Appendix 2. The estimation of the model is done through the method of maximum likelihood since we have data on individual observations (Gujarati 1988), while the computer program used is *Statistica*.

G. Relationships between Dependent and Independent Variables

Taking the first variable (X_1), which is the age of the female respondent, it may be hypothesized that the probability of current use of contraceptives among married women would be positively associated with age as younger women would be less prone to usage of contraceptives on the ground that they would like to raise children at the early stage of married life. Accordingly, the sign of the estimated coefficient might be positive. However, it could also be argued that married women, if young in age, would tend to postpone raising children to have a more free life, thus raising doubts about a firm conclusion about the possible nature of the sign. For these reasons, one cannot be sure until a conclusive two-tailed t test would confirm the nature of relationship. For the present, the relationship would remain ambiguous.

As regards duration of marriage (X_2), a woman who has had longer years of married life would be anxious to take precautions against unwanted pregnancy, hence there is a greater probability that she would prefer to use contraceptives compared to one with less number of years of marriage. Therefore, the sign of the estimated coefficient could be expected to be positive. A contrary position that could be taken is if the married woman had postponed the decision to raise children during the early years of marriage, it is less likely that she would use contraceptives in later years of marriage. Therefore, the sign of the coefficient would be ambiguous as well, until a conclusive two-tailed t test would confirm the relationship actually obtained.

With regard to living children (X_3), which is a measurable quantitative variable, it might be postulated that the higher the number of children a married woman might have, the greater would be the probability of her use of contraceptives, on the ground that the desire for children might have been satisfied to a greater extent compared to women with lesser number of children. Hence, in accordance with the theoretical expectations as well as conclusive empirical evidence gathered from similar studies conducted elsewhere, it could be hypothesized with a relatively high degree of certainty, that the direct association of the explanatory variable with the dependent variable would be signified by a positive sign of the estimated coefficient.

Regarding child loss, the variable (X_4) would take the value of 0 if the respondent had experienced such a loss and in that eventuality, there is a greater probability of non-use of contraceptives so as to reach the desired number of children. If the mother had not experienced any child loss, the variable would take the value of 1 and there is greater probability for such a woman to use contraceptives, compared to women who have had

a child loss, thus indicating a positive association. The estimated coefficient in the present case would have a positive sign.[4]

The variable, desire for more children (X_5), takes the value of 0 if the respondent indicates such a desire. If the married woman desires more children, the probability of her using contraceptives would be less and hence the association between the dependent variable and the explanatory variable would be in the same direction. In case the respondent expresses no such desire to have more children, the variable takes the value of 1. The probability of women with no desire for more children using contraceptives is higher and hence the association between the dependent variable and the explanatory variable is direct. The sign of the estimated coefficient is therefore hypothesized to be positive.[5]

In regard to education of wife (X_6) and education of husband (X_7), both being quantitative variables expressed in years, the hypothesized relationship between the respective variable with the dependent variable is one of positive association. In accordance with the theories of fertility control as discussed in Section II, there is a high degree of probability of contraceptive use among married women with a greater number of school years. As regards education of husband, it is hypothesized that educated husbands would appreciate the need for fewer children and would be able to educate women in fertility control, hence influencing decision making. Thus, the signs of respective estimated coefficients of both variables X_6 and X_7 are expected to be positive.

Again in accordance with theoretical expectations, employment opportunities of women would reduce dependency on spouses and contribute to empowerment of women, raising their ability to take control of themselves and confer greater independence in decision making. Since outside employment would interfere with child rearing time, it is hypothesized that employed women would use contraceptives to prevent births and thus the probability of use would be higher among working women. Therefore, the hypothesized relationship between the explanatory variable, occupation of wife (X_8, taking the value of 1, if employed or 0, if housewife) and the dependent variable would be direct and hence the sign of the estimated coefficient would be positive. It is also hypothesized that the variable, occupation of husband (X_9, taking the value of 1, if employed and 0, if unemployed) is also positively associated with the dependent variable and accordingly, it is expected that the sign of the coefficient would be positive.

As regards family income variable (X_{10}), which is a quantitative variable measured in thousands of vatu per month, the hypothesis is in accordance with Becker's theoretical explanation that at a higher income level, families would aim for quality for children in terms of better education, and hence the desire to have fewer children. Accordingly, the probability of use of contraceptives among married women with high family income would be high. Accordingly, the sign of the estimated coefficient of the variable is expected to be positive.

The variables, X_{11}, X_{12}, and X_{13} are for electricity, radio, and TV respectively. Each of them is a dichotomous variable and takes the value of 1, if the respondent reports availability of electricity or access to radio or TV. They take the value of 0, in case the

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[4] It should be noted here that the signs would be reversed, if we had given the values differently (yes=1 and no=0). The interpretation of the signs would therefore be in accordance with the assumed value of the qualitative variable.

[5] Again, it should be stated here that the relationship would be reverse under assumptions of values in the opposite direction.

response is to the contrary. In accordance with the theoretical background covered in Section II, we can hypothesize that with availability of electricity and a successful communication campaign, disseminating the benefits of planned families at the micro level as well as giving information on availability, use, and methods of contraception, which are represented here by X_{12} and X_{13} variables, would be directly associated with probability of use of contraceptives among married women. Accordingly, it is expected that the signs of the estimated coefficients of X_{11}, X_{12}, and X_{13} would be positive.

Finally, the variable X_{14}, represents counseling on the use of contraceptives as well as monitoring the safety and efficacy of contraception methods. The hypothesis is that probability of use of contraceptives is high among women who have benefitted from visits of family planning workers. Accordingly, the dependent variable would be positively associated with the explanatory variable, whose sign would therefore be positive. The expected signs of the coefficients of the estimated variables are indicated in the last column of Table 4.

H. Results of Logit Model Estimation

As a first step, tests were undertaken to check the presence of any multicollinearity between the independent explanatory variables. Tests revealed no such presence of multicollinearity.[6] Consequently, all the explanatory variables were entered and the equation fitting the logit regression equation was estimated. The results are presented in Table 6.

Although the estimated equation emerged with a highly significant Chi-square,[7] only six of the independent explanatory variables were found statistically significant. Two-tailed *t* tests were resorted to rule out any ambiguity on the relationship of the respective variable with the dependent variable. Accordingly the variables relating to number of living children (X_3), child loss (X_4), wife's education (X_6), occupation of husband (X_9), and visit of family planning workers (X_{14}) were found highly significant at one percent level, whereas wife's occupation (X_8) was significant at 15 per cent level.

Among the remaining variables, present age (X_1) and duration of marriage (X_2), whose ambiguous relationships were noted earlier, were not found significant at all. With regard to the variable, desire for more children (X_5), there has been substantial empirical evidence obtained from other studies that absence of desire to have children would lead to greater probability of contraceptive use. The estimated coefficient of the variable, although with the expected sign, was not found significant. A strange result, however, was obtained in relation to the variable, husband's education (X_7), in that the coefficient of the sign was found negative. However, the coefficient was found statistically not significant indicating that the null hypothesis that the husband's education had no influence on the dependent variable cannot be rejected.

Family income (X_{10}) and IEC variables (X_{11} to X_{13}) exhibited theoretically expected positive signs, following findings of other empirical studies on contraceptive behavior. However, in the present study, they did not exhibit any high degree of significance.

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[6] These included testing intercorrelation matrices of explanatory variables and checking whether all coefficients have low *t* scores. Absence of these indicate no serious multicollinearity problem.

[7] The usual R2 is not meaningful while estimating the logit model, as the dependent variable is a qualitative variable. The Chi-square test is, therefore, suggested (Gujarati 1988). See Appendix 2.

TABLE 6
Results of Logistic Regression Analysis
[Dependent Variable: ln p/(1-p)]

Variables	Logistic Coefficient	Logistic Coefficient	Logistic Coefficient	Logistic Coefficient	Logistic Coefficient
Present Age (X_1)	-0.388		-	-	-
	(-0.527)		-	-	-
Duration of Marriage (X_2)	-0.526		-	-	-
	(-0.581)		-	-	-
Living Children (X_3)	0.684[a]	0.526[a]	0.483[a]	0.526[a]	0.514[a]
	(2.843)	(3.321)	(3.159)	(3.319)	(3.343)
Child Loss (X_4)	1.744[a]	1.705[a]	1.751[a]	1.704[a]	1.679[a]
	(3.366)	(3.316)	(3.500)	(3.314)	(3.378)
Desire more Children (X_5)	0.433	-	-	-	-
	(0.711)	-	-	-	-
Wife's Education (X_6)	0.384[a]	0.396[a]	0.396[a]	0.390[a]	0.433[a]
	(3.065)	(3.277)	(3.500)	(3.362)	(3.995)
Husband's Education (X_7)	-0.115	-0.015	-	-	-
	(-0.118)	(-0.162)	-	-	-
Wife's Occupation (X_8)	0.772[d]	0.782[c]	0.765[d]	0.787[c]	0.953[b]
	(1.486)	(1.544)	(1.535)	(1.556)	(1.939)
Husband's Occupation (X_9)	2.071[a]	2.179[a]	2.215[a]	2.154[a]	2.224[a]
	(2.367)	(2.551)	(2.641)	(2.567)	(2.791)
Family Income (X_{10})	0.035	0.027	0.058	0.024	-
	(0.427)	(0.338)	(0.793)	(0.754)	-
Electricity in Home (X_{11})	0.149	0.039	-	0.021	-
	(0.252)	(0.067)	-	(0.037)	-
Radio in Home (X_{12})	0.851	0.751	-	0.762	-
	(1.048)	(0.930)	-	(0.947)	-
TV in Home (X_{13})	0.493	0.400	-	0.404	-
	(0.925)	(0.758)	-	(0.768)	-
Visit of FP Workers (X_{14})	5.887[a]	5.923[a]	5.907[a]	5.936[a]	5.893[a]
	(6.269)	(6.466)	(6.503)	(6.493)	(6.578)
Constant	-9.291[a]	-10.097[a]	-9.408[a]	-10.148[a]	-9.623[a]
	(-4.226)	(-6.066)	(-6.715)	(-6.198)	(-6.921)
Model Chi-square	267.9	265.59	263.47	265.56	262.68
Degrees of Freedom	14	11	7	10	6
Model Probability	0.000	0.000	0.000	0.000	0.000

Notes: Figures in parentheses denote calculated "t" values.

[a] significant at 1 per cent level by two-tailed t-test

[b] significant at 5 per cent level by two-tailed test

[c] significant at 10 per cent level by two-tailed test

[d] significant at 15 per cent level by two-tailed test

Perhaps, the reason appears to be that the interfamily differences relating to income, availability of electricity, and access to radio and TV facilities were small to exert any significant influence on the dependent variable.

Step-wise regression analyses were conducted, which did not improve either the overall results or the significance of the explanatory variables. These results are also reported in Table 6. Retaining only the already determined significant variables, the following equation was estimated, which emerged as the most acceptable.

$$\ln(p/1-p) = \underset{(-6.921)}{-9.623} + \underset{(3.343)}{0.514X_3} + \underset{(3.378)}{1.679X_4} + \underset{(3.996)}{0.433X_6} + \underset{(1.939)}{0.953X_8} + \underset{(2.791)}{2.224X_9} + \underset{(6.577)}{5.893X_{14}}$$

Model Chi-square = 262.680 Degrees of freedom = 6
(Figures in parentheses denote calculated "t" values)

where X_3 = number of living children
X_4 = child loss
X_6 = wife's education in number of years
X_8 = wife's occupation (housewife=0 and employed=1)
X_9 = husband's occupation (unemployed=0 and employed=1)
X_{14} = visit by family planning workers (no=0 and yes=1)

All the parametric coefficients are statistically significant. The demographic variables, namely number of living children and child loss, positively affect the log of the odds, and the socioeconomic status of wife both in terms of years of education and employment status are directly associated with the dependent variable. Similarly the husband's employment status positively influences the log of the odds. The variable as a proxy for counseling, namely visit by family planning workers, emerged with high degree of significance, positively influencing the dependent variable.

The overall findings of the empirical analysis can be seen more comprehensively by examining the predicted probabilities of contraceptive use derived from the regression equation. The predicted probabilities for each of the variables are calculated by transforming the log-odds back into probabilities after evaluating the regression equation for different independent variables, holding all other variables constant at their means. These are shown in Table 7.

The findings of the empirical analysis are: (i) Among the demographic variables, the higher the number of living children, the greater is the predicted probability of contraceptive use. Married women with five and more children using contraceptives would be about 86 per cent as compared to married women with three to four children, whose predicted probability would be 74 per cent; and those with one to two children whose predicted probability would be 51 per cent. (ii) Among currently married women, those who have not experienced any child loss and using contraceptives would be around 80 per cent as compared to 42 per cent of mothers who have experienced child loss. (iii) The predicted probability of contraceptive users among educated married women with ten or more years of schooling is much higher at 91 per cent than that with less number of years of schooling, i.e., five and less years of schooling at 28 per cent and six to nine years at 77 per cent. (iv) While the probability of housewives using contracep-

tives would be around 60 per cent, the probability of employed women using contraceptives would be much higher at 80 per cent. (v) The probability of contraceptive use by wives of men who are employed is much higher at 81 per cent than those of unemployed men whose predicted probability would be 31 per cent. (vi) Contraceptive use among the women is strongly influenced by counseling advice through personal visits by family planning workers, as indicated by the high probability of 99 per cent compared to those women who did not get the benefit of such visits.

TABLE 7
Predicted Probabilities of Contraceptive Use[a]

Variables	Use of Contraceptives
Living Children	
No children	0.449
1-2 children	0.509
3-4 children	0.739
Above 5 children	0.860
Child Loss	
Yes	0.423
No	0.797
Wife's Education	
0-5 years	0.275
6-9 years	0.768
More than 10 yrs	0.907
Wife's Occupation	
Housewife	0.604
Employed	0.798
Husband's Occupation	
Unemployed	0.314
Employed	0.809
Visit of Family Planning Workers	
No	0.204
Yes	0.989

[a] Calculated by evaluating the regression equation for each value of the variable of interest, holding all other variables in the model constant at their means. Predicted log-odds are then transformed back into probabilities.

V. Conclusions and Implications for Bank Operations

A. Conclusions

Results of this first-ever survey on the current use of contraceptives among the married women of reproductive age group living in Port Vila, the capital of Vanuatu, are encouraging. The results show that socioeconomic policies aimed at empowerment of women through improved opportunities for education and employment to improve their status would contribute to higher motivation for limiting family size. Further, improved health care and child health programs would contribute to reduction in infant mortality and ensure child survival so that the desire to have more children on the grounds of uncertainty of survival of living children will be decreased.

The major conclusion is that a woman-centered strategy for population management is urgently called for. The strategy should pay attention to health care programs and generation of greater educational and employment opportunities in accordance with the recommendations of the United Nations International Conference on Population and Development (UN ICPD) held in Cairo in September 1994 (United Nations 1994). Further, the influence of mass media should be recognized and harnessed, supplemented by improved counseling advice and greater number of visits by family health workers to married women in the reproductive age group.

B. Implications for Bank Operations

Although the percentage of users of contraceptives in Port Vila among the currently married women of reproductive age is far higher than the national average of 15 per cent, there should not be any room for complacency, since 80 per cent of the total population living in outer islands, which have lesser access to transport and communication facilities, has not been targeted yet. This is because some of the main elements are missing in Vanuatu for a core population planning and welfare program, as identified by the Bank *Symposium on Population Policy and Economic Development* held in 1993, and documented in the *Bank Population Policy Paper* (1994) and elsewhere (Sadik 1991). The missing elements are: (i) a strong political commitment; (ii) a coherent population policy; (iii) an appropriate action plan to implement the population policy; (iv) a strong IEC campaign integrated into the action plan; (v) institutional arrangements for a vertical or an integrated program structure depending on resource availability; (v) quality of services, promoting greater access to counseling, contraceptives, and trained and competent staff; and (vi) recognition of active support for private sector operations, especially nongovernmental agencies.

The Bank has taken a major step by providing advisory technical assistance (ADTA) to enable the government to formulate a population policy and action plan for implementation. The ADTA has been designed to contribute to evolution of a political commitment, which will be based on the Program of Action adopted by the participating member countries at the UN ICPD.

Depending upon the components of the ensuing action plan under the recently approved TA, the Bank may consider necessary direct assistance, including technical and loan assistance, for upgrading educational facilities, with special emphasis on programs

for girls and women, and programs of assistance toward empowerment of women and preventive health care, including reproductive health and nutrition, as well as intensification of IEC campaigns to promote family planning. Since Vanuatu, like other SPDMCs, receives substantial bilateral assistance in terms of grants, it is considered essential for the Bank to play a lead role in bringing about effective coordination in channeling flows of grant resources to these priority areas.

APPENDIX 1

SURVEY QUESTIONS

			(Tick ☐)
1	Name		☐
2	Practising family planning	Yes No	☐ ☐
3	Age	less than 25 yrs 25 - 40 years 41 - More	☐ ☐ ☐
4	Marital duration (years)	less than 5 years 5 to 10 years 10 to 15 years 15 and above	☐ ☐ ☐ ☐
5	Number of living children	no children 1 - 2 children 3 - 4 children 5 - more	☐ ☐ ☐ ☐
6	Child loss	Yes No	☐ ☐
7	Want more children	Yes No	☐ ☐
8	Education (years)	None 1 - 5 years 6 - 9 years 10+ years	☐ ☐ ☐ ☐
9	Husband's education	None 1 - 5 years 6 - 9 years 10+ years	☐ ☐ ☐ ☐
10	Your occupation	Housewife Employed	☐ ☐
11	Husband's occupation	Government Private Sector Unemployed	☐ ☐ ☐
12	Monthly income	Less than 50,000 Vt 50,000 - 100,000 Vt 100,000 - 150,000 Vt 150,000 - above	☐ ☐ ☐ ☐
13	Family planning adopted by you	Yes No	☐ ☐
14	Methods	Modern (Temporary) Sterilization Traditional No use	☐ ☐ ☐ ☐
15	Family planning adopted by husband	Yes No	☐ ☐
16	Methods	Modern (Temporary) Vasectomy Traditional No use	☐ ☐ ☐ ☐
17	Electricity in home	Yes No	☐ ☐
18	Radio in home	Yes No	☐ ☐
19	TV in home	Yes No	☐ ☐
20	Visit of family planning workers	Yes No	☐ ☐

APPENDIX 2

Notes on Methodology

A. Bivariate Analysis

A study of relationships between a dependent variable and a given independent explanatory variable is studied under bivariate analysis. The dependent variable in the present case has two outcomes: use or non-use of contraceptives. Thus, the respondents to the questionnaire are divided into two categories, users or non-users of contraceptives. Consequently, the sample is divided into two proportions: proportion of users to total number of respondents and proportion of non-users to total number of respondents. The objective of bivariate analysis is to check whether the observed differences between two proportions are due to chance or whether they can be attributed significantly to differences in proportion they are categorized under a given independent explanatory variable, for example, years of marital duration.

The statistic used for testing the null hypothesis that the observed differences are due to chance is Chi-square. If the null hypothesis is true, the sampling distribution is approximately the Chi-square distribution. The null hypothesis could be rejected, when the calculated Chi-square statistic is larger than the critical value for the number of degrees of freedom. Rejection of null hypothesis means that observed differences in the proportion of users and non-users to total number of respondents can be attributed to the distributional influence of the given independent explanatory variable.

B. Multivariate Analysis

Under multivariate analysis, the objective is to test the combined influence of a number of independent explanatory variables. Since by definition there are a number of independent explanatory variables to be considered in exploring the relationship to the dependent variable, the recommended approach is a multiple regression analysis. The dependent variable in the present study takes dichotomous values, either 1 or 0. The positive response of the interviewee to the question whether she is a current user of contraceptives is given the value of 1 and a negative response is given a value of 0. If an ordinary regression equation is fitted, there is no assurance that the predicted value would lie between 0 and 1. To ensure that such a situation does not arise, the following functional form (known as logistic curve) is adopted.

$$ln\,[p/1-p] = a + bX + u$$

where p is the value of the dependent variable, taking the value between 0 and 1. This model is known as the logit model. The left hand side of the equation is called the log-odds ratio. Thus, the log-odds ratio is a linear function of the explanatory variables. Solving the equation for p by first exponentiating both sides, we get

$$\phi = \frac{1}{\left[1+e-(a+bx+u)\right]}$$

It may be seen if $b>0$, then p takes the value of 0 when X is equal to negative infinity, and 1 when X is equal to positive infinity. Thus, p can never be outside the range [0,1]. The logit model is estimated by regressing $ln\,[p/1-p]$ against constant and independent explanatory variables. The independent explanatory variables may be either quantitative or qualitative and may also include dummy variables (Gujarati 1988).

The standard form of fitting a logit model equation is therefore the following:

$$\ln (p/1\text{-}p] = a + bX_1 + BX_2 + \ldots\ldots + BX_n + u.$$

If the data on individual observations are available, the recommended procedure for estimating the model is by the method of maximum likelihood (ML). On the other hand, if we have grouped observations, ordinary least squares (OLS) method can be used (Gujarati 1992). Since we have the data on individual observations, the ML method is used. The standard errors and *t* ratios are *asymptotic* ones, that is, they are for large samples. For the logit model, the usual R-square is not a reliable measure of goodness-of-fit and is not particularly well-suited for the dichotomous dependent variable models (Gujarati 1988). The suggested alternative is Chi-square test, which is described below:

$$\text{Chi - square} = \sum_{i=1}^{G} \frac{N_i\left(\hat{p}_i - p_i^*\right)^2}{p_i^*\left(-p_i^*\right)}$$

where N_i = number of observations in the ith cell
$\hat{p}_i$ = actual probability of the event occuring
p_i^* = estimated probability
G = number of cells

For large samples, Chi-square is distributed according to the Chi-square distribution with $(G\text{-}k)$ degrees of freedom, where k is the number of parameters in the estimating model ($k < G$).

The computer package used for analysis is *Statistica*. The program does not give any R-square; however the program results give Chi-square with probability of the estimated model, standard errors, and calculated t values for each variable.

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