Contraceptive Use in a Changing Service Environment: Evidence from Indonesia During the Economic Crisis

Elizabeth Frankenberg, Bondan Sikoki, and Wayan Suriastini

In the late 1990s, most Southeast Asian countries experienced substantial economic downturns that reduced social-sector spending and decreased individuals' spending power. Data from Indonesia were collected in 1997 (just before the crisis) and in 1998 (during the crisis) that are used in this study to examine changes in the contraceptive supply environment and in women's choices regarding contraceptive use. Despite substantial changes in providers' characteristics during the first year of the crisis, no statistically significant differences are found between 1997 and 1998 in overall levels of prevalence, in unmet need, or in method mix. Women's choices regarding source of contraceptive supplies, however, changed considerably over the period. Changes in the contraceptive supply environment are linked here to changes in women's choice of source of supply, and a number of providers' characteristics are found to be significantly associated with women's choices in this regard. (STUDIES IN FAMILY PLANNING 2003; 34[2]: 103–116)

Most of the countries of Southeast Asia experienced economic crises during the late 1990s. Similar phenomena have occurred in Argentina, Brazil, Ecuador, Mexico, and Russia in recent years. Two consequences of such crises are reductions in social-sector spending, which likely affect the price and quality of health and family planning services, and a decrease in individuals' spending power as currencies decline and prices rise. Because such crises typically have hit countries suddenly, relatively little is known about the consequences of an economic downturn for reproductive health services and for women's choices concerning contraceptive use.

In this study, change in the contraceptive supply environment in Indonesia during the economic crisis is examined using unusually rich data collected from service providers in 1997 and 1998. The data are from two rounds of the Indonesia Family Life Survey (IFLS), a longitudinal survey of individuals, households, communities, and facilities. Because the surveys were conducted using interviews with individuals as well as with providers, women's choices regarding contraceptive use are also examined, and these choices are related to characteristics of the providers to which women have access.

The IFLS data are unusual in that the 1997 and 1998 surveys bracket a period of dramatic and unexpected economic downturn. Although the crisis of the late 1990s affected many Asian countries, Indonesia was hardest hit, with the gross domestic product per capita shrinking by 12 percent in 1998 and the currency depreciating by about 80 percent (Arndt and Hill 1998; Stalker 2000). In Indonesia, large-scale currency depreciation has major implications for reproductive health services, because most medical and family planning supplies are imported (UNFPA and ANU 1998). Consequently, the service environment in late 1998 differed substantially from that which had existed just one year earlier, a situation having a potential impact on individuals' contraceptive behaviors.

Changes that occurred during the first year of Indonesia's economic crisis are described here in terms of providers' characteristics, patterns of women's contraceptive use, and women's choices with regard to source of contraceptive supplies. Choices concerning contraceptive use and source of supply in 1993 are also documented here to determine whether differences in women's behaviors between 1997 and 1998 reflect the impact of the crisis as opposed to a continuation of longer-term trends.

Additionally, for 1997 and 1998, during which years great changes in the supply environment occurred, the

Elizabeth Frankenberg is Assistant Professor, Department of Sociology, 264 Haines Hall, University of California at Los Angeles, Los Angeles, CA 90095. E-mail: efranken@soc.ucla.edu. Bondan Sikoki is Director, SurveyMETER, Yogyakarta, Indonesia. Wayan Suriastini is a graduate student, RAND Graduate School, Santa Monica, CA.

relationship between women's choices regarding source of contraceptive supplies and the characteristics of the service environment is analyzed. Although understanding this relationship is critical for determining which investments attract clients to which sectors, few previous analyses have considered the relationship between providers' characteristics and choice of provider.

One exception is a study conducted in the Philippines, which found that clients are most attracted to local clinics that focus almost exclusively on family planning (Akin and Rous 1997). Few of the measures of providers' characteristics are significantly related to choice of provider, although increasing distance from the clinic and the availability of other health services there appear to deter use.

A far larger number of studies have considered the relationship between adoption or continuation of contraception and the service environment—in particular, the availability of family planning services. Studies from the 1970s and early 1980s generally document a positive association between contraceptive use and access to services (see Rodriguez 1978; Tsui et al. 1981; Chen et al. 1983; Cornelius and Novak 1983). The effects of family planning program inputs on contraceptive use in later studies are more mixed (see Pullum 1991; Tsui and Ochoa 1992; Guilkey and Cochrane 1993; Entwisle et al. 1996; DeGraff et al. 1997; and Mroz et al. 1999).

Relatively few studies have been able to consider service quality. Pullum (1991) examines variations in contraceptive prevalence rates across Guatemalan communities as a function of both access and quality. He finds that the quality measures he is able to consider (staffing, availability of pills, and availability of sterilization) matter little. Mensch and her colleagues (1996) examine the link between the quality of family planning services in the community and the practice of contraception in Peru. They find that the likelihood of contraceptive use rises as quality improves, although the effect is not large. Koenig et al. (1997) show that women's perceptions of family planning field-workers' quality in Bangladesh are positively related to subsequent adoption and continuation of contraception.

Two important methodological difficulties arise in the literature on the link between the contraceptive service environment and patterns of contraceptive behavior. One of these is the lack of available data concerning that relationship (Pullum 1991; Entwisle et al. 1996; Mensch et al. 1996; Akin and Rous 1997; Koenig et al. 1997). Data that support linking individual women to detailed community-specific information about service availability and quality for different types of providers and for multiple providers of the same type exist for only a few countries.

The second methodological difficulty is the potential for reverse causality to bias estimates of the association between the service environment and contraceptive behavior. For example, if government programs target areas where contraceptive use is low, the correlation between access to these programs and contraceptive use will be biased downward. Statistical methods that address this issue include fixed effects, instrumental variables methods, and structural equations. These methods have been applied successfully in analyses that examine the link between access to services and contraceptive use and between access to services and fertility (Gertler and Molyneaux 1994; Angeles et al. 1998; Hotchkiss et al. 1999). They have not been applied in analyses of source of contraceptive supply, perhaps in part because it is less clear how government manipulation of access to programs will affect a woman's choice of provider among the options within her community. These methods are not used for this study because of its small sample sizes (precluding use of fixed effects), its numerous measures of characteristics for multiple types of provider (precluding finding an identifying instrument for each measure), and finally, because differences in providers' characteristics between 1997 and 1998 may have resulted largely from an exogenous and unexpected downturn in the economy rather than from policymakers' intentional manipulation of the service environment in an attempt to target high- or low-fertility areas with particular types of services.

The Indonesian Setting

Notwithstanding the economic crisis of the late 1990s, socioeconomic development in Indonesia has improved significantly over the past three decades. From 1967 to 1997, Indonesia's gross domestic product (GDP) per capita increased by almost 5 percent per year. At the same time, the country achieved nearly universal enrollment in primary school and reduced the infant mortality rate by about two-thirds. Fertility declined as well, from 5.9 children per woman of reproductive age in the late 1960s to 2.8 children in 1997—a decrease ascribed to several factors: economic growth, rising levels of education, women's labor-force participation, increases in age at marriage, and a strong national family planning program (Hull 2002).

Indonesia's National Family Planning Coordinating Board (BKKBN) has won numerous accolades and is often cited as a model for family planning programs in the developing world (Warwick 1986; World Bank 1990; Hull 2002). BKKBN coordinates a number of activities designed to reduce fertility and to provide a full range of

contraceptive services at a high level of quality (Hamidjoyo and Chauls 1995; Wilopo 1997; UNFPA 1998). Central objectives include promoting the small-family norm, educating women about family planning, recruiting village-level family planning volunteers, and working with the Ministry of Health (MOH) to distribute contraceptives and to organize outreach efforts (Hugo et al. 1987; Suyono 1988; United Nations 1991). The primary program-supported methods are oral contraceptives, injectables, implants, intrauterine devices (IUDs), male and female sterilization, and condoms.

Methods that must be obtained in a clinical setting, such as implants and IUDs, are available from government health centers (physician-headed clinics that provide subsidized primary health care), private practitioners (doctors, midwives, and nurses), and government and private hospitals. Some of these providers also offer sterilization. Generally these facilities and providers serve a catchment area that includes more than one village or municipality.

Village midwives are another, relatively new, source of contraceptives. To address poor maternal health, the Ministry of Health trained and placed some 54,000 midwives in rural and underserved villages during the 1990s (MOH 1994; Handayani et al. 1997). For at least three years after placement, these midwives receive a salary, supplies, and supervision from the Ministry of Health, and in some cases from BKKBN. During this period they establish a quasi-private practice that will be self-sustaining after the period of government subsidization ends. Although village midwives are government employees, they are similar to private providers in that each has a solo practice and some flexibility in setting fees (hence we refer to them here as quasi-private providers).

Methods that do not have to be obtained in a clinical setting are available at the fixed-site clinics and private practices described above and at commercial pharmacies and community-based distribution points. Community-based distribution of family planning has a long history in Indonesia. In the 1970s, BKKBN hired family planning field-workers from local communities to cultivate new contraceptive users and to distribute the resupply methods that require no medical training. As use grew, field-workers could no longer handle resupply. In response to this situation, BKKBN developed village family planning posts. Local volunteers recruited from the village elite administered these posts, distributing condoms and pills that they received from the family planning field-workers (MOH 1990; Shiffman 2002).

In the late 1970s, family planning posts were merged with nutrition posts. These in turn became "integrated service posts" (*posyandu* or community health posts) when new functions were added in 1986 (MOH 1990). The community health posts offer monthly activities organized by neighborhood volunteers and attended by women of reproductive age and children younger than five, primarily for the purpose of nutritional monitoring. Ideally, the posts are also attended by health-center staff and family planning field-workers or, more recently, by village midwives. If trained health workers are present, the posts provide contraceptive injections. Otherwise, oral contraceptives and condoms are available (Kosen and Gunawan 1996).

Most villages have several health posts, and many still have a family planning post as well. Although these posts benefit from outreach by government health and family planning workers, they function differently from and far more fluidly than fixed-site government sources of supply such as health centers and hospitals. They are open only one morning per month; they are usually held at the home of one of the village volunteers or in the village hall; they focus on serving only those in the immediate neighborhood; and they exist because of the energy of volunteer workers from the neighborhood. For these reasons, we refer to these posts and to family planning posts as community rather than government sources of supply.

Changes in contraceptive pricing policy have accompanied the evolution of contraceptive distribution policy. Typically, for much of the 1970s and 1980s, contraceptives were available free of charge. Beginning in the late 1980s, the "Blue Circle" social marketing campaign encouraged users to purchase contraceptives from the private sector (which routinely charged for services), while the "KB Mandiri" (family planning self-motivation and self-sufficiency) movement pushed users to pay small fees for methods still subsidized by the government (Sihombing 1994; Jensen 1996; Kantor Mependuduk et al. 1998). Although most government facilities charge for family planning services, prices are considerably lower at government than at private providers.

Demographic and Health Survey data indicate that efforts to encourage self-sufficiency in family planning have had an impact. By 1997, more than half of all women practicing contraception relied on the private sector for supplies, and only 16 percent of users received contraceptives for free. The majority of users paid something for their contraceptives, regardless of whether they obtained them from government, private, or community sources. Payment for contraceptives was almost universal among users of oral contraceptives and injectables. Greater proportions of IUD and implant users reported receiving their methods free of charge (CBS et al. 1998).

The economic crisis of the late 1990s affected the contraceptive distribution and pricing mechanisms in place in Indonesia as of 1997. The Indonesian *rupiah* came un-

der pressure in the latter part of the year, falling from around 2,400 rupiahs per US dollar in July to about Rp4,800 per dollar by December of that year. In January 1998, the rupiah collapsed, to Rp15,000 per US dollar, and continued to fluctuate wildly in value for the first three-fourths of the year (Frankenberg et al. 1999). Sharp increases in prices accompanied the financial chaos. Estimates calculated by the Central Statistical Bureau put annual inflation at about 80 percent in 1998.

In Indonesia, changes of this magnitude have the potential for substantial impact on health and family planning services. Many supplies are imported, so a higher exchange rate resulted in higher prices. Lack of confidence in the country's banking system prevented domestic pharmaceutical companies from obtaining foreign credit so that they might import the raw materials necessary for manufacturing products within Indonesia. Cuts in transport budgets limited outreach activities as well as routine supervision and monitoring (UNFPA 1998).

In anticipation that supply-side changes would reduce contraceptive prevalence and induce women to switch to cheaper methods and to subsidized public providers, policymakers responded to the situation by obtaining increased support for contraceptive procurement from a number of donor agencies, by suspending efforts to encourage users to pay for a greater share of method costs, and, as part of a more general social safety-net program, they issued cards to poor households that provided access to free health and family planning services (UNFPA 1998). Most of the early loans for the safety programs were put in place during the 1998–99 fiscal year. The pace at which the associated programs were implemented is not clear, but the data used here (described below) indicate that as of late 1998, only about 3 percent of households had health cards entitling them to free health and family planning services.

Another response involving the distribution mechanism for contraceptive methods requiring resupply was confirmed by field observations conducted in 1998 (NFPCB et al. 1999). Prior to the crisis, government health centers took responsibility for obtaining contraceptive supplies for their catchment areas from BKKBN's district office. From the health center, supplies arrived in villages via two routes: Health-center workers brought supplies to the village midwives, and family planning field-workers' supervisors brought supplies from government health centers to the workers, who in turn brought them to community distribution points.

In 1998, nationwide shortages in contraceptive commodities were evident, and BKKBN could no longer routinely fill health centers' requests for supplies to meet their projected needs over the next several months (UNFPA 1998). Instead, distribution was based much more closely on short-term needs. Policy changed to allow family planning field-workers' supervisors to obtain contraceptives directly from BKKBN's district offices, rather than waiting until they were distributed to health centers (NFPCB et al. 1999). Field-workers' supervisors then allocated supplies both to health centers and to the workers.

Data

The data used for this study are drawn from the Indonesia Family Life Survey (IFLS). The IFLS represents 83 percent of the Indonesian population and contains information about more than 30,000 individuals living in 321 communities. Within each community, interviews are conducted with as many as 12 providers of health and family planning services. For the IFLS1, conducted in 1993, a total of 7,224 households were interviewed (Frankenberg and Karoly 1995). IFLS2 was fielded in 1997 with the goal of reinterviewing all households that had participated in IFLS1. Ninety-four percent of IFLS1 households and 91 percent of target respondents were interviewed successfully (Frankenberg and Thomas 2000).

By January 1998, Indonesia clearly was not being spared the economic downturn gripping much of Asia. To provide information on the immediate impact of the crisis, we conducted another round of the survey one year after IFLS2. For this survey, IFLS2+, a 25 percent subsample of IFLS households were interviewed in 90 of the 321 original IFLS communities. More than 98 percent of target households and 95 percent of target respondents were successfully interviewed in IFLS2+.

The sample of communities for IFLS2+ was drawn in two stages. First, to reduce costs, seven of the original 13 IFLS provinces were selected (Central Java, Jakarta, North Sumatra, South Kalimantan, South Sumatra, West Java, and West Nusa Tengarra). Second, within these provinces, enumeration areas were purposively selected to match the IFLS sample as closely as possible. The households selected for IFLS2+ cover the full socioeconomic range and the entire spectrum of economic activity represented in the larger sample.

We also compare the family planning service environment (in 1997) in the communities selected for IFLS2+ to the environment measured for the full set of IFLS communities. The comparisons are made for 33 indicators that reflect availability, price, and quality of services related to family planning (not shown). For 27 dimensions, including a composite index of service quality, sample communities were indistinguishable from the larger group of communities. The indicators for which a statistically significant difference was found included the availability of Norplant® implants and IUDs (slightly more and less available, respectively, at both government and private providers in the sample communities), the price of

injectable contraceptives at government health centers (slightly higher in the sample communities), and the availability of injectable methods at community health posts (slightly more available in the sample communities).

The family planning service environment in 1997 and 1998 is compared using data from the IFLS facility survey, which covered four main types of providers: government health centers, private practitioners, quasi-private village midwives, and community health posts.

In 1997, the facilities at which we conducted interviews were selected from household survey responses to questions about the respondents' knowledge of government health centers, private practitioners, and community health posts. In each community, the most frequently mentioned facility of each type was selected for interviews, and additional facilities were selected at random. In 1998, interviewers were instructed to reinterview people at the facilities surveyed in 1997. If a facility could not be recontacted, interviewers substituted a facility of the same type based on the recommendation from the community leader. For the 90 IFLS communities analyzed here, the 1997 interviews took place at 260 government health centers, with 526 private practitioners, and at 178 health posts. In 1998, interviews took place at 237 government health centers, with 479 private practitioners, and at 159 health posts.

The facility questionnaires collect information about the availability, price, and quality of health and family planning services. The questionnaires administered at government health centers, private practices, and village midwives' practices are similar. The government health-center instrument is the most comprehensive because these facilities are the most complex. The director of the health center is asked to designate an appropriate respondent for each module. Both the health center and the private-practice questionnaires collect data on the availability and prices of services, lab tests, and drugs, and on the availability of equipment and supplies. Both questionnaires include sections in which interviewers record direct observations of the facility's cleanliness and other features that might influence its attractiveness to patients. Five hypothetical patient scenarios probe the respondents' knowledge of correct procedure with respect to provision of IUDs and oral contraceptives, prenatal care, treatment of a child with vomiting and diarrhea, and treatment of an adult with a respiratory illness.

The questionnaires were designed to provide data that could be used to measure the facility's functional capacity (adequacy of the laboratory, pharmacy, equipment, staff, and physical environment) and the adequacy of specific services for general outpatient care, care for pregnant women, well-baby care, and family planning.

The questionnaire for community health posts reflects the far narrower role that health posts play in service provision. The health-post questionnaire asks about the characteristics of the volunteer staff (including their general education and health training), about the frequency of their contact with outreach workers from the government health center and with family planning field-workers, about the services offered at the post, and about the availability of supplies and equipment.

Apart from direct observations of facilities' cleanliness and attractiveness, much of the data collected at the facilities are based on providers' recall and are not independently verified by the interviewer. Such verification is not feasible given the length of the questionnaire, the necessity of establishing a constructive interview climate so as to gain the cooperation of the respondent, and the fact that interviewers are university graduates rather than trained medical personnel. Interviewers introduce themselves as members of a university research team rather than as working for a government project, giving providers no obvious incentives for misrepresentation. No evidence was found to suggest that providers systematically misrepresent their situation either positively or negatively, and for the most part, the questionnaires do not cover particularly sensitive topics.[1] Unfortunately, because no other data are collected at this level of detail from facilities in Indonesia, we cannot compare the IFLS data to another source of information.

The four types of providers interviewed in the IFLS facility survey account for about 80 percent of the sources from which IFLS respondents report receiving family planning services. The most commonly mentioned sources not interviewed as part of the facility survey were hospitals, pharmacies, village family planning posts, and family planning field-workers.

Providers' Characteristics During the First Year of the Crisis

By comparing results from the 1997 facility survey to those from the 1998 survey we can assess the extent of change facilities experienced during the first year of Indonesia's economic crisis. With respect to understanding shifts in the supply environment during the period of economic downturn, we focus particularly on characteristics that policymakers projected would change rapidly, namely commodity availability and prices for various methods of contraception.

As an overall measure of the supply environment, we create a composite measure of ability to offer family planning services of high quality. The index combines two elements of Bruce's quality-of-care framework: method choice and appropriate constellation of services (Bruce 1990). It is formed by summing a set of dichotomous measures of the availability of five types of oral contra-

ceptives, two types of injectable contraceptives, implants, two types of IUDs, hemoglobin and pregnancy tests, iron tablets, aspirin, an antibiotic, and possession of a vaginal speculum. For government health centers, private providers, and village midwives, this composite measure can assume values from zero to 16. For community health posts, which offer a narrower range of services, the measure is constructed by summing dichotomous measures of whether pills, injectables, iron tablets, and prenatal care and treatment are available.

Descriptive statistics summarizing characteristics of government health centers, private practitioners, village midwives, and health posts are presented in Table 1. With respect to the composite quality of family planning services (top panel), government health centers receive the highest scores, averaging almost 12. Quasi-private village midwives provide the next-highest quality of services, with scores averaging above ten. The average score for private practitioners is between six and seven. The average score for community health posts is about three, reflecting that the services they offer are far more limited. The quality of services provided by government health centers, quasi-private village midwives, and health posts does not change significantly over time, a finding suggesting that these sources of family planning services neither expanded nor restricted their services between 1997 and 1998. A significant improvement in the overall quality of family planning services at private providers is observed.

The bottom panel of Table 1 focuses more narrowly on the availability and price of reversible methods of contraception. In both years, almost 90 percent of government health centers offered oral contraceptives. A similar proportion offered injectable methods. Among private providers, about half offered pills. In 1997, 69 percent of private providers offered injectables—a figure that rose significantly to 75 percent by 1998. The proportion of village midwives offering pills fell from 95 percent in 1997 to 78 percent in 1998—a statistically significant decline. The proportion of community health posts offering pills fell as well, but not significantly. At none of the providers did a decline in offering Norplant® implants or IUDs take place.

Changes in the service environment during the first year of the crisis are much larger if we consider stock outages and prices. The proportion of community health posts with pills in stock fell during the year, dropping by almost 20 percentage points between 1997 and 1998.

Table 1 Index of overall quality of family planning services and availability and price of contraceptives, by method and provider, Indonesia, 1997 and 1998

Index of overall quality (0–16)	1997	1998
Government health centers	11.9	11.6
Private providers	6.3	6.9*
Quasi-private village midwives	10.3	10.5
Community health posts	2.9	2.9

Method/provider	Percent offering		Percent experiencing stock outages[a]		Average price (in rupiah)			Percent offering method for free	
	1997	1998	1997	1998	1997	1998 nominal	1998 real[b]	1997	1998
Oral contraceptives									
Government health centers	88	88	na	na	708	836	490*	18	15
Private providers	51	49	na	na	2,761	2,797	1,661*	4	7
Quasi-private village midwives	95	78*	na	na	812	1,356*	808	16	5
Community health posts	79	72	76	57*	444	1,039*	618*	23	2*
Injectable contraceptives									
Government health centers	86	89	16	48*	3,148	8,054*	3,627*	2	2
Private providers	69	75*	5	22*	5,385	9,665*	5,668	0	1
Quasi-private village midwives	95	100	12	25	4,318	7,958*	4,700	0	0
Community health posts	39	37			3,080	6,775*	3,975*	5	0*
Norplant®									
Government health centers	61	58	na	na	3,938	6,214*	4,665	11	14
Private providers	15	14	na	na	18,342	33,098*	19,260	0	5
Quasi-private village midwives	38	41	na	na	7,548	12,636*	7,139	5	14
Intrauterine devices									
Government health centers	75	78	na	na	2,193	3,530*	2,026	15	14
Private providers	24	27	na	na	18,583	27,382*	16,065	2	2
Quasi-private village midwives	38	46	na	na	10,088	13,109	7,692	21	12

*Difference statistically significant at $p \leq 0.05$. na = Not available.

[a] Respondents at community health posts were asked whether oral contraceptives were currently in stock. Respondents at government health centers, private providers, and village midwives' practices were asked if they had experienced a stock outage in the past six months. In 1997, interviews were conducted with 260 government health centers, 467 private providers, 55 village midwives, and 178 community health posts. In 1998, interviews were conducted with 237 government health centers, 480 private providers, 54 village midwives, and 159 community health posts. [b] Real prices are deflated using province- and month-specific inflation rates from Indonesia's Central Bureau of Statistics.

These changes may reflect changes in the contraceptive commodity-distribution system described earlier. In 1998, government health centers were less involved in contraceptive procurement, so that the availability of oral contraceptives may have been reduced at health posts and village midwives' practices. With respect to injectables, government health centers, private providers, and village midwives all report a higher frequency of stock outages in 1998 than in 1997, but the change is particularly dramatic for government facilities. In 1997 only about 16 percent of government facilities experienced such a drop in supplies of injectables in the six months before the interview, whereas by 1998, the proportion experiencing an outage had risen to almost 48 percent.

Price changes also occurred between 1997 and 1998. Nominal and real prices are presented here.[2] At both government and private providers, increases in pill prices between 1997 and 1998 were negligible in nominal terms but declined significantly in real terms. Little real change occurred in pill prices at the practices of village midwives, although the nominal increase was significant. Between 1997 and 1998, sizable price increases, in both nominal and real terms, occurred at community health posts. Moreover, the proportion of community health posts offering pills for free fell drastically, from 23 percent in 1997 to only 2 percent in 1998. Availability of free pills declined at the practices of village midwives as well (this change is significant at $p<0.08$), but not at government clinics. With respect to pills, government health centers apparently responded to BKKBN's temporary suspension of efforts to encourage clients to absorb greater responsibility for the costs of contraception, and private providers apparently followed suit.

Trends in prices for injectables, which are largely imported, differ from those for pills. Nominal prices rose significantly at all types of providers, but real prices rose significantly only at government health centers and at community health posts. The proportion of health posts offering injections for free fell over the period, reaching zero in 1998.

Finally, at providers that offered Norplant and IUDs, nominal prices rose (the increases are statistically significant in most cases), but real prices did not. Nor were there significant changes in the proportion of providers offering Norplant or IUDs for free.

Patterns of Use During the 1990s

Changes in the supply environment documented above have the potential to affect women's contraceptive-use behavior. In each round of the household survey, currently married women aged 15–49 were asked whether they were practicing contraception, what method they used, and the provider from whom they obtained that method. As noted above, in addition to presenting the results for 1997 and 1998, we include descriptive statistics for 1993 to help establish the extent to which changes occurring between 1997 and 1998 represent new patterns of behavior rather than a continuation of trends established prior to the crisis.

Information on contraceptive prevalence levels, method mix, and reasons for nonuse are presented in Table 2 for currently married women aged 15–49. Prevalence was 52 percent in 1993, 55 percent in 1997, and 53 percent in 1998. These changes in prevalence are not statistically significant. Results from Indonesia's National Socioeconomic Survey yield similar levels of prevalence: 55 percent in 1997, 1998, and 1999 (Molyneaux 2000).

Another way to characterize contraceptive use among women who say they want no more children and who are not currently pregnant or experiencing postpartum amenorrhea is to consider the proportion of women who are using a method. For each of the three years, contraceptive prevalence is around 70 percent for these women. The data provide no evidence that an increase in unmet need for contraception accompanied Indonesia's economic downturn.

As for contraceptive method mix, in each year, pills and injections are by far the most popular contraceptives, followed by IUDs, implants, and sterilization. In

Table 2 Percentage of currently married women aged 15–49 who use a method of contraception, by method, and percentage of nonusers, by reason for nonuse, Indonesia, 1993–98

	1993	1997	1998
Currently use any method	52	55	53
Percent using a method who want no more children[a]	72	69	71
Method used			
Pill	38	38	35
Injectable	25*	36	36
IUD	12*	7	8
Norplant®	7	9	10
Male or female sterilization	10*	6	7
Condom/vaginal methods	2	1	1
Traditional methods	7*	2	2
Reasons for nonuse[b]			
Cost	1	2	4*
Difficult to obtain	1	1	1
Currently or recently pregnant/ wants to become pregnant	54*	40	47*
Health reasons/side effects	32	36	34
Other	19	23	19*
(N)	(1,373)	(1,335)	(1,587)

*Difference statistically significant between 1993 and 1997 or between 1997 and 1998 at $p \leq 0.05$.

[a]Excludes women who are currently pregnant or experiencing postpartum amenorrhea. [b]Women could mention more than one reason for nonuse (although few did); therefore, the distributions sum to more than 100.

1993, women chose IUDs more frequently and injections less frequently than in latter years. These differences are statistically significant, as is the decline in use of sterilization between 1993 and 1997. Differences in method mix between 1997 and 1998 are small and not statistically significant.

The table also shows the reasons nonusers give for choosing not to practice contraception. The distributions are generally similar across the three years. Between 1997 and 1998, the proportion of women who reported that they did not practice contraception because of cost doubled, rising from 2 to 4 percent—an increase that is statistically significant but substantively small. These results in combination with the lack of change in contraceptive prevalence suggest that changes in price and stock outages of contraceptives during the first year of the crisis did not put contraceptives out of reach for a substantial proportion of women.

The results presented in Table 2 suggest that, despite the economic crisis, the aggregate patterns of contraceptive use in 1998 are similar to patterns in 1997. Relative to the trend between 1993 and 1997, however, the rates of decline in the use of IUDs and increase in the use of injectables appear to have ceased between 1997 and 1998.

Similar levels of overall use and of method chosen for the latter two years may mask shifts in prevalence or method choice for various population subgroups. For example, real expenditures per capita declined by 24 percent between 1997 and 1998; this decline may have resulted in reduced contraceptive use among the poorest women (Frankenberg et al. 1999). Results are presented here from a multinomial logistic regression (in which coefficients are expressed as relative risks) of method choice (pills, injectables, other modern methods, or traditional methods, relative to no use) in relation to age, educational attainment, household economic resources, and residence (see Table 3).

The age categories contrast women aged 15–29 with women aged 30–49. Younger women are more likely to choose injectable contraceptives over nonuse than are older women, but they are less likely to choose other modern methods over nonuse than are older women. Age is unrelated to use of pills or traditional methods relative to nonuse. These patterns are found for both 1997 and 1998.

Education and levels of household expenditure per capita measure socioeconomic status and household resources. We include two dichotomous measures of educational attainment: whether women have attained between six and nine years of education and whether women have attained ten or more years of education (the reference category is zero to five years of education). To capture economic status, we include a dichotomous indicator of whether a woman resides in a household in

Table 3 Multinomial logistic regression of women's choice of contraceptive method, by method, according to age, education, household economic resources, and residence, Indonesia, 1997 and 1998

Method/sociodemographic variable	1997	1998
Oral contraceptive		
Age (years)		
15–29	1.44	0.96
30–49 (r)	1.00	1.00
Education (years)		
0–5 (r)	1.00	1.00
6–9	0.80	1.15
10+	0.74	0.86
Economic status		
Lowest 25 percent[a]	0.60*	1.03
Other 75 percent (r)	1.00	1.00
Residence		
Rural (r)	1.00	1.00
Urban	1.33	1.24
Injectable		
Age (years)		
15–29	1.67*	1.49*
30–49 (r)	1.00	1.00
Education (years)		
0–5 (r)	1.00	1.00
6–9	2.60*	2.33*
10+	1.78	1.39
Economic status		
Lowest 25 percent[a]	0.80	0.99
Other 75 percent (r)	1.00	1.00
Residence		
Rural (r)	1.00	1.00
Urban	1.00	1.25
Other modern method		
Age (years)		
15–29	0.58*	0.54*
30–49 (r)	1.00	1.00
Education (years)		
0–5 (r)	1.00	1.00
6–9	1.16	1.54*
10+	2.40*	1.89*
Economic status		
Lowest 25 percent[a]	0.86	1.10
Other 75 percent (r)	1.00	1.00
Residence		
Rural (r)	1.00	1.00
Urban	0.98	1.04
Traditional method		
Age (years)		
15–29	0.42	0.76
30–49 (r)	1.00	1.00
Education (years)		
0–5 (r)	1.00	1.00
6–9	2.51	1.66
10+	7.81*	1.56
Economic status		
Lowest 25 percent[a]	1.38	0.37
Other 75 percent (r)	1.00	1.00
Residence		
Rural (r)	1.00	1.00
Urban	4.37*	3.73*
(N)	(1,335)	(1,583)

*Significant at $p \leq 0.05$. [a]Indicates household in which expenditures per capita are below the twenty-fifth percentile of the distribution.

Notes: Comparison category = nonuse. Coefficient estimates are presented as relative risks. Errors are adjusted for clustering at the community level.

which expenditures per capita are below the twenty-fifth percentile of the distribution.

Education is associated with women's choices regarding contraception. In both years, women with six to nine years of education were significantly more likely to use injectable methods (relative to not using a method) than were their less educated counterparts. In 1998, women with six to nine years of education were also more likely than their less educated counterparts to use other modern methods relative to not practicing contraception. In both years, women with at least ten years of education were more likely than women with five or fewer years of education to use other modern methods, relative to not practicing contraception. Finally, in 1997, women with at least ten years of education were far more likely to use traditional methods (relative to using none) than were women with five or fewer years of education.

With one exception, economic resources show little relationship with contraceptive-use patterns. In 1997, women from the poorest 25 percent of households were less likely than women from better-off households to use the pill (relative to using no method).

Patterns of contraceptive use for subgroups are largely the same across the two years. Similar aggregate levels of contraceptive prevalence in 1997 and 1998 do not appear to mask changes in use for particular socioeconomic and demographic subgroups of women.

Women's choice of provider is another dimension of contraceptive behavior to consider. Because pills and injectables account for almost three-fourths of all contraceptive methods used, and because these methods require regular resupply, distributions of users by supply source for the pill and injectables are examined in detail in Table 4. Respondents specified their source of supply from a list of 16 possible choices. We aggregate women's responses regarding their choice of source of supply into the following seven groups: government providers (including public hospitals, health centers, and mobile health workers); private providers (including private hospitals, clinics, and solo practitioners); quasi-private village midwives; pharmacies; community health posts; village family planning posts and field-workers; and friends or relatives. For 1997 and 1998, we are able to distinguish the quasi-private village midwives from other private-sector providers. The 1993 question about source of supply did not distinguish village midwives from other private providers, however, in part because village midwives were still relatively uncommon in 1993 (only 10 percent of IFLS villages had a village midwife in 1993, whereas by 1997, 45 percent of the communities surveyed had one) (Frankenberg and Thomas 2001).

Table 4 Percentage distribution of users of oral and injectable contraceptive methods, by source of method supply, Indonesia, 1993, 1997, and 1998

	Oral contraceptives			Injectable methods		
Source	1993	1997	1998	1993	1997	1998
Government providers[a]	31.9	22.7*	20.8	43.3	34.6	21.7*
Private providers[b]	24.7	24.9	19.6	53.2	57.5	64.1
Quasi-private village midwives	na	4.3	6.4	na	4.6	10.9*
Community health posts	20.9	18.8	10.2*	3.5	2.1	1.4
Family planning post or field-workers	18.1	17.5	27.9*	—	1.2	2.0
Pharmacies	1.6	7.9*	7.9	—	—	—
Friends or relatives	2.8	3.9	7.2	—	—	—
(N)	(183)	(231)	(265)	(142)	(243)	(295)

*Difference statistically significant between 1993 and 1997 or between 1997 and 1998 at $p \leq 0.05$. na = Not available.
[a] Includes public hospitals, health centers, and mobile health workers. [b] Includes private hospitals, clinics, and single-practice providers.

The first three columns of the table display the results for oral contraceptives. In 1993, most pill users relied on government providers (32 percent), private providers (25 percent), health posts (21 percent), or family planning posts or field-workers (18 percent). By 1997, a substantial and statistically significant decline occurred in the fraction of those obtaining the pill from government providers. Use of pharmacies increased significantly, however, and village midwives emerged as a source of supply.

Between 1997 and 1998, reliance on health posts declined by nine percentage points, and use of family planning posts or field-workers rose by ten percentage points. Both of these changes are statistically significant. Use of government and private providers fell slightly, and reliance on village midwives and friends or relatives rose, but none of these changes is statistically significant.

The second three columns of the table display the results for injectable methods. In 1993, 43 percent of users received injections from government providers and 53 percent of users obtained their injections from private sources. The remaining 4 percent relied on community health posts. Between 1993 and 1997, reliance on government providers fell, whereas reliance on private providers increased and village midwives emerged as a source for this type of method. The changes in source of supply between 1993 and 1997 are not statistically significant. The pattern of change is similar but strikingly larger between 1997 and 1998. In this one-year period, use of government providers fell by 13 percentage points, use of private providers rose by six percentage points, and use of village midwives rose by six percentage points. Changes in use of government health centers and village midwives are statistically significant.

Providers' Characteristics and Choice of Method Source

Although contraceptive prevalence and method mix are nearly identical in 1997 and 1998, for those using resup-

ply methods, choice of source of contraceptive supplies differs considerably across the two years. These changes may reflect the alterations in providers' characteristics documented above. For users of injectable methods, price increases and a relatively greater increase in stock outages at government health centers may have encouraged women to shift toward private providers and quasi-private village midwives. For oral contraceptive users, supply bottlenecks at health posts and village midwives' practices may have encouraged shifts to the use of family planning posts and field-workers.

With respect to injectables, between 1997 and 1998, users of public providers switched sources, increasing their reliance on village midwives and private providers. Unfortunately, specifying a model of provider choice for users of injectable methods that adequately captures the service environment is not possible because of the combination of complex and extensive changes in providers' characteristics, small sample sizes, the dominance of private providers as a source of injections, and the absence of village midwives in some communities.

The role of the service environment in women's choice of pill provider can be examined, because users of oral contraceptives are more evenly distributed according to types of providers that are available in all communities. For 1997 and 1998, we estimate multinomial logistic regressions in which the unit of analysis is a woman who uses oral contraceptives and the outcome of interest is her choice for source of pills among community health posts, family planning posts or field-workers, government providers, private providers, and a residual category that groups together those who obtained pills from village midwives, pharmacies, or friends and relatives (results for this last category are not shown but are included in the specification to account for the full set of choices). We highlight the first four categories of providers of oral contraceptives mentioned above because the descriptive statistics for providers' characteristics suggest that government health centers, private providers, and community health posts differ from one another in important ways and because these are the groups of greatest importance in the distribution of users' choices.

To examine the role that providers' characteristics play in determining which kind of provider a woman is likely to choose, the service options to which she has access must be described. Community-specific measures for each provider type are constructed here. Although the theoretical literature posits the importance of service quality, relatively few analyses document the role quality plays in women's contraceptive choices. To test the role of quality, we include the community mean of the quality index for government health centers and for private facilities. Historically, family planning field-workers have played an important role in contraceptive commodity distribution in Indonesia—a responsibility that appears to have grown during the economic crisis (NFPCB 1999). To capture the role of family planning field-workers, we include a variable measuring the number of visits the field-worker makes in a year to the community. Visits are modeled as a linear spline with a knot at 12 visits—a specification that allows the impact of field-workers' visits to differ by their frequency. Finally, because of declines in the purchasing power of individuals and changes over time in the relative prices of oral contraceptives according to provider, we include measures of the average price of pills at government health centers, private facilities, and community health posts.

In addition to the characteristics of the supply environment, the users' socioeconomic status may also affect her choice of source of supply. We include dichotomous indicators of whether a woman has six or more years of education, whether expenditures per capita in her household place her in the lowest quartile of the expenditure distribution, and whether she lives in an urban area. In 1997, a woman's education and level of economic resources were unrelated to her choice of service provider. Relative to women in rural areas, however, women in urban areas were far less likely to obtain their pills from family planning posts or field-workers and far more likely to obtain them from private sources than from community health posts.

The results for family planning posts and field-workers, government providers, and private providers, presented as relative risks, appear in Table 5. Community health posts serve as the comparison category. Standard errors are estimated using a Huber correction to adjust for clustering at the community level. As the results demonstrate, in 1997, as the quality of government providers rose, women were more likely to obtain pills from a family planning post or field-worker than from a community health post. No other factors affect the choice of a family planning post or field-worker in preference to a health post.

In communities where field-workers' visits occurred more than once per month, increasing frequency of these visits decreased the likelihood of receiving pills from government or from private providers instead of from health posts, in 1997, as shown in columns two and three. The frequency of field-workers' outreach activities appears to play a significant role in encouraging use of community-based rather than government or private services.

In contrast with 1997, economic resources (but not education) are related to source of supply in 1998. Women in poorer households are considerably less likely to obtain their pills from government or private sources (relative to community health posts) than are women from better-off households. A woman's economic re-

Table 5 Multinomial logistic regression of women's source of supply for oral contraceptives, by selected characteristics of individuals, households, and service environment, according to type of source, Indonesia, 1997 and 1998

Characteristic	1997			1998		
	Family planning post or field-worker	Government provider	Private provider	Family planning post or field-worker	Government provider	Private provider
Individuals and households						
Education (years)						
0–5	1.00	1.00	1.00	1.00	1.00	1.00
6+	0.88	1.23	1.22	0.52	0.71	1.00
	(0.82)	(0.70)	(0.68)	(0.18)	(0.53)	(0.99)
Lowest 25 percent expenditure per capita distribution	0.55	0.64	0.84	0.51	0.25	0.35
	(0.29)	(0.58)	(0.82)	(0.16)	(0.00)	(0.06)
Residence						
Rural (r)	1.00	1.00	1.00	1.00	1.00	1.00
Urban	0.16	0.55	4.08	0.23	0.62	0.81
	(0.07)	(0.40)	(0.07)	(0.03)	(0.37)	(0.76)
Service environment						
Index of composite quality						
Government health centers	1.56	1.29	1.28	1.16	1.25	1.33
	(0.00)	(0.16)	(0.16)	(0.36)	(0.08)	(0.08)
Private providers	1.03	0.92	1.09	0.97	1.11	1.36
	(0.85)	(0.62)	(0.57)	(0.86)	(0.47)	(0.05)
Family planning field-workers' visits per year (linear spline)						
0–12	0.92	0.95	0.85	0.82	0.77	0.74
	(0.31)	(0.57)	(0.09)	(0.05)	(0.01)	(0.01)
13+	1.00	0.96	0.95	0.96	0.97	0.99
	(0.92)	(0.06)	(0.05)	(0.06)	(0.11)	(0.70)
Average price of oral contraceptives						
At government health centers	0.93	0.95	0.97	0.85	0.94	0.90
	(0.58)	(0.63)	(0.78)	(0.00)	(0.26)	(0.05)
From private providers	1.03	1.05	1.02	1.00	0.99	1.04
	(0.31)	(0.13)	(0.40)	(0.94)	(0.90)	(0.47)
At community health posts	1.02	1.11	1.06	1.43	1.44	1.48
	(0.90)	(0.33)	(0.62)	(0.02)	(0.01)	(0.01)
(N)		(229)			(265)	
Chi-square, individual and household characteristics		23.5 (0.02)			39.9 (0.00)	
Chi-square, service environment characteristics		70.3 (0.00)			85.5 (0.00)	

(r) = Reference category.

Notes: Coefficients are expressed as relative risks. Community health posts serve as the comparison category. Results for an additional category that combines village midwives, pharmacies, family, and friends are not shown. Errors are adjusted for clustering at the community level. P-values of the z-statistics are reported in parentheses.

sources may be more closely associated with her choice of provider in 1998 than in 1997 as the result of the decline in real expenditures per capita that occurred between 1997 and 1998. As in 1997, women in urban areas are less likely to obtain pills from family planning posts or field-workers than from community health posts, but urban residence is no longer related to the choice of private providers instead of community health posts.

Several characteristics of the supply environment are related to the choice of whether to obtain pills from family planning posts or field-workers rather than from community health posts. An increase in the frequency of family planning field-workers' visits is associated with a decreasing likelihood that women obtain their pills from family planning posts or family planning field-workers rather than from community health posts. This finding contrasts with that for 1997, and it may reflect the shift between 1997 and 1998 in the role family planning field-workers played in the distribution of commodities. The increased number of field-workers' visits in 1998 may indicate a greater effort to keep community health posts well stocked (a circumstance that might influence women's likelihood of using health posts rather than other sources). The choice between family planning posts or field-workers and health posts is also associated with the price of pills: The higher prices for pills obtained from health centers discourage the use of family planning posts or field-workers relative to community health posts, whereas more expensive pills found at community health posts encourage use of family planning posts or field-workers relative to the health posts.

The findings show that in 1998 three aspects of the service environment are significantly associated with whether women choose to obtain oral contraceptives from government sources of supply rather than from community health posts: First, as the quality of public providers rises, women are more likely to use government providers than community health posts; second, as the frequency of family planning field-workers' visits rises, women are less likely to choose government

sources of supply than community health posts; and third, as the price of pills at community health posts rises, women are more likely to rely on government sources of supply than health posts.

The 1998 results are similar for the choice between private sources of supply and community health posts. A higher quality of services at private providers is associated with a greater likelihood of choosing private providers rather than community health posts.[3] More frequent outreach visits from family planning field-workers are associated with a reduced likelihood of choosing a private provider over a community health post. Moreover, as the price of pills at community health posts rises, women are more likely to choose private sources of supply than health posts.

Discussion

The results shown in Table 5 provide considerable evidence that the service environment is a significant factor in women's choices regarding sources of oral contraceptives. The relevance of providers' characteristics emerges in 1997, when supply systems were operating fairly regularly, but is more apparent one year later, when providers were dealing with rapid inflation, currency depreciation, and cutbacks in government spending.

Two shortcomings of the statistical approach used here merit discussion. First, we analyze source of contraceptive supplies for women who have made the choice to use the pill. Our results are, therefore, potentially biased because we do not account for selection in the matter of pill use. To correct for selection bias, the use of simultaneous estimation techniques would be necessary to estimate jointly the equations for method choice and for choice of provider for those choosing oral contraceptives, and the error terms allowed to be correlated across the two equations. To avoid relying solely on functional form for identification, we would also need to identify independent variables for each equation that theory suggests do not belong in the other equation. We do not have suitable candidates for such variables. Moreover, in the context of multinomial rather than dichotomous outcomes, these methods are beyond the scope of our analysis because they require estimation algorithms not available in standard statistical packages.

Second, our results for providers' characteristics are potentially biased because we do not try to correct for the possibility of endogenous program placement, whereby providers' characteristics are determined by unobserved characteristics of the community or of women themselves that predispose users to obtain their method from a particular source of supply. As noted above, we do not correct for this source of bias because of small sample sizes and multiple measures of providers' characteristics. We suggest the likely direction of such bias, however.

With respect to the quality of government providers, our knowledge of the policy environment suggests no reason to think that BKKBN or the Ministry of Health intentionally tries to improve the quality of health centers' family planning services in places where women are predisposed toward one type of provider over another. More sophisticated facilities may be located in more sophisticated environments, however, where women view community sources as beneath their consideration. In that case, our results will overestimate the positive relationship between the quality of government services and women's choice of government rather than community providers for oral contraceptives. More plausibly, private providers may concentrate their efforts in areas where women are favorably predisposed toward the use of private sources of family planning services. If that is the case, our estimates of the relationship between the quality of private services and the choice to use private rather than community sources of care are biased upward.

We propose a similar argument for the role of service prices. Misestimation of price effects resulting from providers' ability to tailor their prices to their perceptions of clients' willingness to pay for services seems the most likely source of bias concerning private providers, who have more flexibility than other providers in what they charge and more incentive to set prices so as to keep demand for services high. In our results, prices charged by private providers are unrelated to women's choice of source for contraceptives, possibly because of private providers' endogenous pricing responses.

Finally, with respect to field-workers' visits, the frequency of visits to target areas may be adjusted to respond to the demand for community sources of family planning methods where it is high. If so, our results overstate the role that family planning field-workers play in attracting users to community health posts.

One argument against the idea that correcting for the potential endogeneity of program placement would eliminate the relationships we observe between providers' characteristics and users' choices of contraceptive supply source is that the magnitude and statistical significance of the relationships differ between 1997 and 1998. Little evidence suggests that policymakers were able to fine tune their responses to the crisis to account for women's predispositions regarding sources of supply. For example, although, on average, levels of family planning quality at government providers did not change between 1997 and 1998, higher levels of quality at government health centers played a more significant role in pulling women away from community-based sources of pills in 1998 than in 1997. This finding suggests that individuals responded differently to quality of service in 1998 than they did in

1997, rather than that policymakers altered quality between 1997 and 1998 in order to retarget services.[4]

Two other differences between the 1998 and 1997 results emerge. The number of field-workers' visits to the community appears to have influenced women's supply choices to a greater degree and at a lower frequency of visits in 1998 than in 1997. We believe that this occurred because field-workers were more important as a source of commodity distribution in 1998 than they were in 1997. Additionally, prices played a greater role in women's choices regarding source of supply in 1998 than in 1997. Specifically, higher prices at community health posts in 1998, but not in 1997, are positively and significantly associated with the choice of each of the alternative sources of supply—family planning posts or field-workers, government providers, and private providers.

Conclusions

Our results suggest that a woman's choice of a provider for contraceptive services is related to characteristics of the supply environment, although small sample sizes and other factors preclude the use of research methods that would give us greater confidence in the precise magnitude of the effects. Nevertheless, the results demonstrate the value of obtaining detailed data concerning characteristics of providers linked to information about individuals' contraceptive choices.

Our analysis focuses on a particularly dramatic period of Indonesia's recent history—one in which prices rose more rapidly than incomes, and currency depreciation constrained access to imported commodities. Policymakers correctly anticipated that these factors would lead to commodity shortages. Relative prices across provider types changed as well.

Despite these changes in the service environment, we find no statistically significant differences between 1997 and 1998 in overall levels of contraceptive prevalence, in unmet need, or in method mix: In the first year of the economic crisis, contraceptive prevalence did not decline and unmet need did not rise. In short, no evidence is found to indicate that couples were deterred from practicing contraception during the first year of the crisis. Neither was the first year of the crisis accompanied by rising contraceptive prevalence and declining levels of unmet need, as might be expected if a worsening economic environment increased couples' motivation to avoid pregnancy. The stability of contraceptive prevalence and unmet need in the face of dramatic changes in both the economic and service environments suggests that in Indonesia, couples' fertility plans and their preferences for small families are well-established and that they will continue to fuel a strong demand for family planning services.

Notes

1 A potential exception is that some unlicensed nurses and paramedics may hesitate to admit that they dispense prescription drugs, but such an omission should not affect our ability to characterize the family planning service environment.

2 Real prices are deflated using province- and month-specific inflation rates from Indonesia's Central Bureau of Statistics (Frankenberg et al. 1999).

3 A high level of quality of services at government health centers is also positively related to the choice of private providers rather than community health posts ($p = 0.08$). This result may reflect the situation that many private practitioners work in public facilities in the morning. If the quality of public services in an area is high, the quality of private services is likely to be high as well.

4 We do not make the same argument for the shift over time in the role of quality of private providers. On average, the quality of private services rose between 1997 and 1998, and quality is more strongly associated with the choice to use private providers in 1998. Thus private providers may have altered quality intentionally in order to attract users.

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