

**Skewed Method Mix:  
A Measure of Quality  
In Family Planning Programs**

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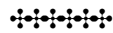
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## Abstract

### **Skewed Method Mix: A Measure of Quality in Family Planning Programs**

While contraceptive prevalence has been a central to family planning research over the past few decades, there has been surprisingly little consideration of method mix, an important aspect of quality of care. There is no “ideal” method mix recognized by the international community; however, there is reason for concern when one or two methods predominate in a given country resulting in “method skew.” In this article method skew is measured using a modified index of dissimilarity. Of the 25 countries with the highest method skew three groups emerge: (1) a first group comprised of half of the high skew countries, all of which (except Turkey) are Sub-Saharan nations where traditional methods predominate; (2) a second group consists of four countries in which female sterilization predominates (China, India, Dominican Republic, and El Salvador); and (3) a third group is made up of nations that rely on a single reversible method (the pill in Algeria, Kuwait, Morocco, and Zimbabwe and the IUD in Cuba, Egypt, Jordan, and Vietnam). Possible explanations for these patterns of method skew are explored through a review of the literature. Of the five variables tested using linear regression (access, physicians per inhabitant, religion, GNP, and region) two correlates of method skew emerge: access and region. Method skew is lower in high access areas and in Latin America as compared to Asia or Africa. This article demonstrates the utility of the index of dissimilarity as a macro-level measure that may be used to monitor method skew in family planning programs worldwide.

## **SKEWED METHOD MIX: A MEASURE OF QUALITY IN FAMILY PLANNING PROGRAMS**

### **I. Background**

Almost all countries in the world offer family planning clients a range of contraceptive methods. “Method mix” refers to the distribution of contraceptive methods used by a population (i.e., the percentage that uses each method). There is no “optimal” or “ideal” method mix recognized as such by the international reproductive health community. Indeed, conventional wisdom holds that there is no single “best” contraceptive; rather, couples are encouraged to adopt the method with the most benefits and the fewest drawbacks or side effects, based on their individual perceptions. However, there is often concern at the international level when a single method predominates in a country, suggesting some systematic limitation of contraceptive choice.

On a global basis, the most widely used contraceptive methods are female sterilization, the pill, and the IUD (Robey et al. 1992; Ross et al., 1999). However, the method preferences of a given country may deviate from this. For example, sterilization is not widely accepted in many Muslim countries, even those considered success stories for family planning, such as Indonesia and Morocco. By contrast, it is a vastly popular method in many Latin American countries where the small child norm is widely embraced and women marrying at a fairly young age seek a long-term solution to pregnancy prevention. As for reversible methods, the pill or the IUD often occupy the top position, with many countries showing strong preference for one over the other. Depo-Provera, a three-month injectable, was relatively under-utilized until the early 1990’s, when approval by the FDA created a climate for greater acceptance worldwide. Despite rising

popularity, it has yet to gain the extent of acceptance of the three leading methods (sterilization, the pill, and the IUD).

Whereas contraceptive prevalence has been a central focus of family planning research over the past two decades, surprisingly little attention has been paid to method mix. Two exceptions include the methodology for determining a client-oriented method mix developed by Galway and Stover (1995)<sup>1</sup> and the recent work on the prospects for future trends in contraceptive use. The latter explore what the contraceptive needs of the future will be given the current distribution in method preference and possible changes in future years, and what the contraceptive needs of future generations will be (UNFPA, 1999; Ross et al., 1999; Bongaarts and Johansson, 2000).<sup>2</sup>

Nonetheless, method mix has important programmatic implications. Historically, some programs have emphasized certain methods over others; however the ideal is to offer a balance of methods. During the 1980's and early 1990's, many countries explicitly promoted methods of long duration, both for their effectiveness as well as convenience to users. However, many programs have backed away from promoting any one method over another; instead, they try to give clients the method that they ask for (assuming no medical contraindications).

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<sup>1</sup> Galway and Stover (1995) discuss three steps to determining a client-oriented method mix: (1) identify family planning needs and an appropriate level of contraceptive prevalence by subgroup; (2) identified methods preferred by each subgroup (e.g., spacers and limiters); and (3) calculate a new overall method mix and prevalence of each method.

<sup>2</sup> Bongaarts and Johansson (2000) predict that as quality of services are improved, as markets for contraceptives become more open, and as levels of contraceptive knowledge and education rise, we should expect a great variety of contraceptives in use and a more balanced distribution among different modern methods.

Method skew refers to the extent to which one or two methods “dominate” in a given country. This phenomenon occurs for different reasons, summarized in Table 1. They relate broadly to policies and programs, provider bias, history, properties of the methods themselves, and client characteristics. Of these five, the first two are of greatest concern, because they reflect the supply environment and suggest lack of the broadest choices.

The objectives of this article are

1. To identify those countries with the greatest skew in method mix
2. To identify correlates of method skew at the global level
3. To explore possible reasons for the predominance of a given method in the 25 countries with the most pronounced method skew
4. To assess the utility of method skew as a macro-level indicator of quality of care

## **II. Methodology**

The data for this analysis were drawn from nationally representative surveys (primarily the Demographic and Health Surveys) in 83 countries that met two criteria: having a population of at least one million inhabitants and having conducted a DHS-type survey since 1980.<sup>3</sup>

The quantitative analysis consisted of three parts. The first involved establishing a “model method mix” against which to estimate method skew in the 83 countries. The second phase consisted of identifying correlates of method skew using bivariate and multivariate linear

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<sup>3</sup> DHS or similar national level large-scale surveys, including those conducted by the Centers for Disease Control and Prevention and national research institutions.



regression. The third phase involved estimating the degree of association between method skew and contraceptive prevalence.

### **A. Measuring Method Skew**

In this analysis method mix refers to the distribution of seven categories of contraception: female sterilization, vasectomy, the pill, injectable, IUD, condoms/other barrier methods, and traditional methods. Although measures of dissimilarity (used to define method skew) are more robust when fewer categories are used, preliminary analysis employing five versus seven categories of contraceptive methods yielded comparable results. Thus, in this article we present all seven categories as being more reflective of contraceptive options in family planning programs of developing countries today. Our approach to measuring method mix was as follows.

Because there is no widely recognized ideal method mix, it was first necessary to establish a “model” or “standard” method mix. We considered four alternative distributions as candidates for a “model method mix” against which countries would be judged:

1. The equal (uniform) distribution across all methods of contraceptives; 14.3 percent of contraceptors use each of the seven methods
2. The unweighted average of the distribution of 10 countries that most closely approximate this uniform distribution and have a contraceptive prevalence above 25 percent
3. The global method mix calculated from existing DHS-type data sets
4. The unweighted average of the 10 countries that most closely adhere to the “global average” (in option #3)

The current analysis uses the second of these four options. Although an exactly equal distribution across all methods (option #1) would reflect a total absence of bias in method selection, it is not necessarily “ideal” if it does not meet the individual desires of the populations involved. For example, given the highly limited acceptance of vasectomy in many developing countries, it would be unusual (and might even suggest coercion) if countries attained as high a level of use of vasectomy as of the other six methods. We rejected option #3 (the global average) and option #4 (the average of the 10 countries most closely adhering to the global average) on the basis that the global average itself could be highly skewed. Rather, the final choice of index (option #2 above) combines an element of “equal distribution” with the actual experience of what men and women are willing to use.

To measure method skew (i.e., deviation from the model method mix), we used a variation of the index of dissimilarity (ID). The ID is a summary measure of the difference between two distributions, based on the absolute differences between the percents for each category (Shrycock and Siegel, 1973). Although the more conventional use of this index is to measure differences between two or more populations in terms of age or ethnic composition, the ID provides a means of quantifying the extent to which a given country deviates from a standard distribution of contraceptive method mix. Through a series of preliminary analyses, it was determined that a modified approach using the standard deviation performed better than the conventional ID, which uses the average deviation (Rice, 2000). Thus, we adopted the standard deviation approach in this analysis to establish the extent to which the 83 countries deviated from the model method mix.

## **B. Identifying Correlates of Method Skew**

Given the little attention that has been paid to method mix, there was interest in determining whether there are factors at the macro-level that correlate with method skew in different countries. Several of the continuous variables to be tested had a skewed distribution, so we treated them as categorical variables. We tested the bivariate association by including each variable or set of dummy variables describing a correlate in a linear regression. Finally, we developed a parsimonious model by means of backward elimination of terms from a multiple linear regression.

## **C. Testing the Relationship of ID and Contraceptive Prevalence**

We computed Pearson product moment correlations between our estimate of method skew and the key outcome indicator for family planning programs: contraceptive prevalence.

# **III. Results**

## **A. Skewed Method Mix**

Table 2 shows the contraceptive distribution reflecting the “model” method mix, based on option #2 above. Of note, even the 10 countries that most closely adhere to an equal distribution across all seven methods—used in the remainder of the analysis as the standard—are far from having an equal distribution (e.g., 14.3 percent per method). The pill and female sterilization each account for 22 percent of use, traditional methods for 18 percent, condom/barrier for 14 percent, and injectable and IUD for 11 percent. Only two percent relied on vasectomy. It should be stressed that this “standard” distribution does not represent a global distribution of methods used, but

rather the method mix in the ten countries showing the least departure from a uniform distribution (listed in Table 3).

Table 4 lists the 25 countries with the greatest method skew; the modified index of dissimilarity reflects the extent of deviation from the “model” or standard distribution. The higher the index of dissimilarity, the greater the skew of the contraceptive method mix in that country. The following patterns of method skew emerge from this analysis.<sup>4</sup>

First, almost half (12 of 25) of the high-skew countries are sub-Saharan nations in which traditional methods continue to predominate. This finding suggests not only lack of choice of a range of methods, but lack of access to any modern contraception (possibly combined with lack of motivation to control fertility). Of note is that all of the countries that rely on traditional methods are African with one exception: Turkey.

The second group of countries consists of four nations in which female sterilization is the leading method (or shares the lead with one other method). Geographical subgroups include China and India in Asia and the Dominican Republic and El Salvador in Latin America. As outlined in Section C (below), factors relating to method skew differ greatly between these two geographical subgroups.

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<sup>4</sup> Note: In some cases the method mix in a given country is from a small base of overall contraceptive prevalence.

A third group of countries is characterized by reliance on a single reversible method: the pill (Algeria, Kuwait, Morocco and Zimbabwe) and the IUD (in Cuba, Egypt, Jordan and Vietnam).<sup>5</sup> The two male methods—vasectomy and condom—did not predominate in any of the 25 high skew countries.

The full list of countries included in this analysis along with the year of data collection, ID score, and distribution by contraceptive method is shown in Table 5.<sup>6</sup> Countries are grouped by region for greater appreciation of contraceptive dynamics within each region. The mean ID score is higher—indicating greater method skew—for countries in Africa (15.9 percent) than in Asia (12.7 percent) or Latin America (11.0 percent).

From the data in Table 5 displaying the percentage using each of seven methods, one can infer why a country scores high or low on the ID. However, one can more formally determine the methods accounting for skew in any given country using the components of chi square. This approach subdivides the total chi-square statistic into separate components to identify the cells with the greatest deviation from expected value.<sup>7</sup> If the component of chi-square is greater than 3.94, the deviation for that cell is considered significant. An application of this is shown in Table 6 for three countries. China represents an interesting example. Whereas casual perusal would suggest that China deviates from the norm based on its relatively high levels of female sterilization and IUD use, in fact the components of Chi-Square indicate a somewhat different

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<sup>5</sup> Although the leading method in China is female sterilization, IUD use follows close behind it. Thus, in the discussion of factors leading to the use of the predominant method in each country, use of the IUD in China is also covered.

<sup>6</sup> Parker Maudlin provided the original data on method mix used in this analysis to the MEASURE *Evaluation* Project. This information was subsequently updated by the data from Ross et al. (1999).

picture. Use of the IUD in China (by 40 percent of contraceptive users) is significantly higher than the expected value (11 percent), though the strongest deviation occurs with regard to the traditional methods for which China (with less than 1 percent traditional method use) falls far below the expected (18 percent) based on the standard. Also, China is significantly below the expected values on the pill, barrier, and injectable. To take a second example, the Dominican Republic, the chi square test confirms what is visually evident: the high use of female sterilization in this population (65 percent) as compared to the standard (22 percent). It also points out the low use of the injectable (1 percent) in comparison to the global standard (11 percent). In a final example, Benin, one finds significant difference in three of the seven categories of methods. Because Benin has such a high level of traditional use (82 percent of all users), it falls well below the expected percentage on two other categories (female sterilization and the pill). In sum, the components of chi square test allow us to further quantify relationships that are generally evident from the ID measure and the method distribution.

## **B. Correlates of Skewed Method Mix**

A second objective of this research was to identify correlates of method skew (as measured by ID).

### **1. Results of the linear regression**

This phase of the analysis was somewhat limited by the availability of data for all 83 countries listed in Table 5. Nonetheless, the following variables for which data were available were hypothesized to predict method skew:

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<sup>7</sup> We arbitrarily used a sample size of 100 for these analyses.

**Access:** the greater the access to contraception, the lesser the method skew (reliance on just one or two methods).

**Physicians per inhabitant:** the greater the concentration of physicians, the greater the method skew to contraception requiring clinical intervention.

**Religion:** the higher the percent Muslim, the lesser the percent of users opting for sterilization, resulting in a greater method skew. Also, the higher the percent Catholics, the greater the percent relying on rhythm, resulting in greater method skew.

**GNP:** the higher the GNP, the greater the percentage of the population able to enjoy contraceptive choice and thus the lower the method skew.

**Region:** Latin American countries are more likely to promote a variety of methods and thus will have a lower contraceptive skew than African or Asian countries.

“Access” was measured by the 1994 Family Planning Program Effort Index,<sup>8</sup> based on the responses of key informants knowledgeable about the family planning programs of one or more countries (Ross and Mauldin, 1996).<sup>9</sup> Other sources of the information were as follows: number

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<sup>8</sup>The Family Planning Program Effort Index has four components: policy positions, services, evaluation, and method availability. Taken together, the index has been useful in cross-national comparisons of program strength. The scores are based on key informant opinion and should not be construed as precise measures (in this case, of access to services). However, the access score from the FPPEI is the only measure of access to services available for a wide range of countries, and thus we have opted to use it in this analysis.

<sup>9</sup>The “contraceptive choice index,” comprised of access scores for five modern contraceptive methods (condoms, oral contraceptives, IUD, female sterilization, and vasectomy), was used for the analysis.

of physicians per inhabitant (UNDP, 2000), percent Catholic or Muslim (Britannica Book of the Year, 1998), and GNP (World Bank, 1997).

Bivariate and multivariate relationships were explored using linear regression. Countries with a population greater than one million and data collected after 1980 were included in the analysis.<sup>10</sup> Of the five variables tested in the multivariate model, only two were found to be associated with method skew: “access” to methods and region. Method skew was lower where access to methods was greater, and it was lower in Latin America than in Asia or Africa; see tables 7 and 8. However, this final multivariate model accounts for only 21 percent of the variance in ID.

Further exploration of the relationship of individual variables to method skew yielded some interesting results (data not shown). For example, predominantly Muslim countries have lower rates of sterilization and injectables, but higher rates of pill and IUD use than do non-Muslim countries. Predominantly Catholic countries have higher rates of female sterilization than do other countries, reflecting the widespread acceptance of sterilization in Latin America, a region that is largely Catholic. Finally, countries with large numbers of doctors have higher rates of female sterilization and IUD use but lower rates of injectable use than do countries with fewer doctors. In sum, the bivariate findings supported a number of the original hypotheses. However, when all factors were included into a multivariate model, the only effects that remained significant were access to methods and region.

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<sup>10</sup> In a preliminary phase, the data were analyzed excluding those countries with less than 15 percent use of modern methods, since this “skew” might not reflect objectionable practices in the supply environment (e.g., targets or incentives, provider bias, etc.). Because this exclusion did not alter the results, those countries with less than 15 percent use of modern methods were retained in the final analysis.



## 2. Testing the relationship of ID to contraceptive prevalence

We hypothesized that a more equally distributed method mix would be correlated with contraceptive prevalence, based on the assumption that greater choice would lead to greater satisfaction and continuation. As shown in Table 9, the correlation between method skew (as measured by of the ID)<sup>11</sup> and contraceptive prevalence is in the expected direction but weak (-.31). We also tested the relationship between year of survey and method skew, on the premise that method availability and choice might have improved with the expansion of family planning programs worldwide. However, the correlation between method skew and year of the survey was not significant (data not shown).

## IV. Possible explanations of Method Predominance from the Literature

What accounts for the predominance of a given method in a given country? The regression analysis explained relatively little of the variability in method mix, due in part to data limitations. By contrast, the published family planning literature provides considerable insight into the patterns of method skew and reasons for the predominance of specific methods in the 25 countries with the greatest method skew.

Our review of the literature points both to supply and demand as key determinants of method choice. On one hand, government policies have strongly influenced method availability in some countries, especially those with explicit goals of fertility reduction. On the other, individual preferences and social norms play an important role, especially where clients have choice. Yet these “preferences” defy easy categorization. In a review of issues related to method choice,

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<sup>11</sup> The modification refers to the use of standard rather than average deviation in calculating dissimilarity. The word “modified” will be dropped but remain implicit for the remainder of the paper.

Shah (1995a) notes that in every country with moderate or high prevalence, the great bulk of use is accounted for by just two or three methods. However, the principal method preferred *differs* from one country to another, as do the *reasons* why clients prefer each method. Weak though it seems as an explanation, the historical factor that certain methods “take root” definitely plays a role in a number of countries (Potter, 1999).

### A. Traditional Methods

In almost half (12 of 25) of the high-skew countries, traditional methods predominate, and in every case except one (Turkey) the country is in sub-Saharan Africa. Multiple factors explain the widespread use of traditional methods (primarily post-partum abstinence, rhythm and withdrawal) in Africa. First, there is a long-standing tradition of post-partum abstinence in a number of African countries, intended to ensure an adequate interval between births. The motive was not to limit the number of children but rather to increase the chances of survival for each child<sup>12</sup> (Page and Lesthaeghe, 1981). Long-term abstinence (extending to a period of 2-3 years in some traditional societies) has its correlate in periodic abstinence (or rhythm), which many couples report to use despite the low levels of knowledge of the fertile period in the woman’s cycle. Other factors reinforcing the use of traditional methods include the lack of availability of contraceptive methods in many parts of Africa, the social stigma attached to family planning use (which becomes “public” with a clinic visit) and the barrier of costs, to mention a few. These coupled with a relatively low motivation for limiting births have created a certain default towards traditional methods, which can be used with little effort, at little cost, but with little effectiveness (National Academy of Sciences, 1993).

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<sup>12</sup> Nonetheless, this practice does set an important precedent for birth spacing that increases the acceptability of family planning programs in Africa.

**B. Female sterilization**

Ross (1992) points out that the high level of sterilization on a global basis results from four factors: its adoption by a wide age range of women, its longstanding availability in many countries, the high levels of continuation (barring some type of failure in the operation), and the levels of adoption. Of key importance in this article is whether the high level of prevalence reflects societal/individual preferences or instead reflects a lack of availability of other methods.

Given the permanent nature of this method, the predominance of sterilization in a given country raises concern. In India and China (two of the four countries in Table 4 in which sterilization predominates), government policy has played a large role in this method skew. In the two others—both Latin countries (the Dominican Republic and El Salvador)—sterilization seems to have become a pervasive societal norm.

In the case of China, the one-child policy launched in 1979 put intense pressure on couples to practice contraception and fertility regulation, especially highly reliable methods of contraception (Kaufman, 1992; Ping, 1995). Different provinces experimented with ways of achieving mandated demographic objectives, including different incentives (extended paid maternity leave, preferential treatment for housing, priority consideration for their child's nursery schools or later schooling) and disincentives (income deductions, forfeiture of health benefits); (David, 1982). The Chinese approach to fertility control has met with harsh criticism from the international community with regard to voluntarism. Ironically, the Open Letter from the Central Committee of the Chinese Communist Party in 1980 exhorted the cadres "never to resort to coercion and commandism and unlawful practices that ignore the interest and conscience of

the people." Several writers have cited the inherent contradiction in China's policy which on one hand has allowed no laxity in implementation, yet on the other exhorts mass voluntarism (Tien, 1982). The emphasis on using effective contraception (primarily the IUD and sterilization) has resulted in limited availability of other methods, especially in rural areas. In practice, women with one child generally use the IUD whereas women with two or more children resort to sterilization, reflecting the government's policy guidelines (Choe and Tsuya, 1991).

In India, concern for population growth dates back half a century. In 1952 India became the first country in the world to establish an official national family planning program. In subsequent years a variety of approaches, including diverse incentives, were tried to expand the delivery of FP services to India's vast population, 80 percent of whom resided in rural areas (David, 1982). However, in contrast to most developing countries that embrace the "cafeteria approach" to service delivery, India devoted its primary FP efforts toward sterilization. Basu's article in 1984 suggested this singular focus: "the method most vigorously propagated and as vigorously opposed is sterilization. Indeed, the increased emphasis on sterilization as the primary method of FP means that even the nominal promotion of other methods tended to fall by the wayside." As a result, "in the smaller villages, fertility control and sterilization are believed to be synonymous." Rajaretnam and Deshpande (1994) describe the strong influence of Indian Population Project program officers on the continued emphasis on sterilization in rural areas of Karnataka state in 1990. "Most of the medical officers stated that district program managers frequently reviewed their performance in promoting and implementing sterilization; workers were thereby compelled or persuaded to promote sterilization methods far more diligently than reversible methods...There was no problem with the adequacy of stocks of IUDs, the pill and condoms,

precisely because they were not much used” (Rajaretnam and Deshpande 1994). The data from recent nationwide fertility studies are consistent with this observation. As of the National Family Health Survey in 1992-93 among almost 90,000 women, 95% knew of female sterilization, compared to only 58-66 percent for the pill, IUD, and condom. Among the 41% of married women using contraception, three-quarters rely on sterilization (International Institute for Population Sciences, 1994).<sup>13</sup>

The apparent reasons for the high level of sterilization in Latin America differ significantly from those in China and India. Sterilization has been a widely accepted means of limiting fertility, especially for women who marry young and have closely spaced pregnancies, yet adhere to the small child norm. The high levels of sterilization in the Dominican Republic (DR) can be traced to the country’s long tradition of offering this method, dating back to the 1940s (although it was only offered as a program method in 1977). According to Baez (1992), early access to female sterilization contributed to forming a new reproductive pattern still observed among women in union, one in which fertility levels have been decreased in an important way but in which early nuptiality and short birth intervals have been retained. In the DR, close to two-thirds of users rely on female sterilization (Perez, 1993). Although women tend to prefer the pill before age 30, recent surveys show that over half of the sterilized women had their operation before age 30. Knowledge of other contraceptive methods is almost universal; however, there appear to be widespread misconceptions about reversible methods and a lack of information about the correct

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<sup>13</sup> Säävälä (1999) presents an interesting counter-perspective: that sterilization at a young age—at least in one rural area of Andhra Pradesh—is highly desired, since it allows young mothers to take a symbolic step toward liberation from childbearing and toward the overwhelming respect and status enjoyed by senior women in India. Anecdotal evidence suggests that there may be a cultural component to avoidance of childbearing after age 30.

use of the pill, accompanied by high failure rates that may have further contributed to the use of sterilization (Loaiza, 1995).

In El Salvador, the high level of sterilization reflects similar factors: a mature sterilization program, higher rates of sterilization among younger women, and decreasing age at sterilization (Rutenberg and Landry, 1993). As in the case of the DR, the median age at sterilization is less than 30 years.<sup>14</sup> In the mid 1980s, allegations appeared in the press that sterilization was being conducted in a coercive fashion. However, a study conducted immediately thereafter among 648 women undergoing the operation in one of the seven primary service facilities showed no evidence of coercion. Most women had known about the operation for an average of three years previously. They had learned about it from other women who had had it, from service providers, and from the mass media; virtually all knew of alternative methods. And most had waited at least a month between taking the decision and having the operation. Only one of the 648 women felt pressured, and the source was her own mother (Bertrand et al., 1986). In short, even by the mid-1980s, El Salvador constituted a country where easy access and strong social approval converged to make sterilization the method of choice.

### C. The Pill

The pill predominates in four of the high skew countries: Algeria, Kuwait, Morocco, and Zimbabwe. In the case of Kuwait, several factors contribute to the predominance of the pill. Kuwaiti nationals comprise less than half (43 percent) of the population, and the government has instituted policies to increase the number of Kuwaitis: a marriage bonus, monthly allowances for

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<sup>14</sup> In fact, in many countries there is a general pattern of women seeking sterilization at a median age of 30 (Ross et al., 1985.).

each child, free education and medical care, generous maternity leave, and so forth. Although contraceptive prevalence is in the moderate range (35% as of 1987), it is primarily for birth spacing, not family size limitation (Al-Gallaf et al, 1995). Thus, it is not surprising that the method of choice is one that allows for easy resumption of childbearing when desired (Shah et al, 1985). The pill has been the method of choice since data on contraceptive use became available in the 1970s. Several factors explain its primacy. The pill is readily available free of charge from government hospitals or at low cost in pharmacies; it is acceptable under Muslim religion; women consider it to be convenient to use. And although users perceive side effects, there are no major rumors about the health effects of the pill. This preference for the pill is expected to continue unabated in the near future, as most women “intending” to use contraception in the future also cite it as their preferred method (Al-Gallaf et al., 1995).

Studies from Morocco (Brown et al., 1995; Hajji and Lakssir, 1996) identify several converging factors that explain the predominance of the pill. There appears to be some provider bias toward pill use, which is strongly reinforced by the widespread social acceptance of the pill and its convenience for providers (Hajji and Lakssir, 1996). Women come to the clinics wanting and expecting to get the pill, and providers try to comply with their wishes. Despite a concerted government investment in the early 1990’s in training, equipment and supplies for IUD insertion, this method only increased from 8 to 9 percent of the method mix between 1991 and 1995 (Ministry of Public Health and The EVALUATION Project, 1998). Anecdotal evidence suggests that a similar situation exists in Algeria.

The predominance of the pill in Zimbabwe also represents a mix of supply and demand factors. From the supply side, the primary family planning service delivery mechanism has been community-based distribution (generally considered to be among the most successful of its type in Sub-Saharan Africa), which requires the provision of non-clinical methods. In terms of demand, the Zimbabwe population has shown great interest in family planning for the purposes of spacing rather than limitation, explaining why a reversible method would have strong appeal in this country (Way et al., 1987).

#### **D. The IUD**

The IUD is the predominant method in Vietnam, Cuba, Egypt and Jordan; and it closely approaches sterilization as a leading method in China. Provider bias appears to play a strong role. In addition, continuation rates tend to be high for the IUD.

Vietnam has had a family planning program since the early 1960s and an explicit policy to lower fertility since the early 1970s. Historically, family planning has been synonymous with the provision of IUDs (Knodel et al., 1995). Goodkind and Anh (1997) note that the primary reliance on the IUD, together with abortion, is typical of former Marxist states, which usually discouraged supply-based methods—reflecting both an indifference to consumer choice and an inability to afford these methods or to keep tight reins on their distribution and use. Reliance on these two methods may have emerged because policymakers see this strategy as the most effective way to meet current fertility targets. The use of incentives for IUD use (and more recently for sterilization) is consistent with this idea (Hieu, 1995).



Vietnam has demonstrated interest in diversifying its method mix. In 1988 the Council of Ministers adopted an official policy of promoting a board range of methods through government programs. The following year the National Assembly passed a Health Law stressing that individuals have the right to use the method of their choice, and it provided recourse to the justice system should there be any attempt to violate this right. UNFPA provided large quantities of oral contraceptives in the early 1990s to further support method diversification. (Knodel et al., 1995; Hieu et al., 1995; Allman et al., 1991). Even so, a 1993 study showed that service providers lacked comprehensive, accurate, and up-to-date knowledge about other methods (Knodel et al., 1995). Consequently, potential users had little access to reliable information, and misconceptions circulated freely. These efforts toward method diversification appear to have had some effect on reducing the predominance of the IUD, given that increases in contraceptive prevalence between 1988 and 1994 were due largely to greater use of the condom and the pill. Still, the IUD has remained number one, suggesting the effect that predominance of a method early in the life of the program can have for the long term.

In China, the widespread use of the IUD reflects the interests of the government to make this low-cost, highly effective method available to couples not yet interested in accepting a permanent method. In fact, the IUD runs just behind female sterilization as the most widely used method in China. As cited above, women with one child generally use the IUD whereas women with two or more children resort to sterilization (Choe and Tsuya, 1991).<sup>15</sup>

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<sup>15</sup> This is related to strong government encouragement for women to adopt the IUD after the first child and sterilization after the second child. It is not clear if this same pattern would emerge in the absence of this policy.

In Cuba, there are two primary means of controlling fertility: abortion and the IUD. The former is legal, though recent statistics suggest a decreasing reliance on this method from 70 abortions per 100 deliveries in 1992 to 59.4 in 1996 (PAHO, 1998). Although abortion is not considered a means of pregnancy prevention, it is a highly effective means of fertility control; with one of the highest abortion ratios in the world Cuba is reported to have a TFR of 1.6 (PRB, 1999). The widespread use of the IUD appears to relate to the high effectiveness and low cost of this method, both important considerations in a health system that is particularly strapped for cash and has no access to commodities from the usual international donors (e.g., USAID or UNFPA). According to PAHO (1998), current contraceptive prevalence is around 79%, and the national family planning program is seeking to expand the variety of contraceptives available, increase their use, and enhance their quality, which could help to reduce the high reliance on abortion and the IUD.

The case in Egypt is somewhat different. There is an explicit government policy favoring lower fertility, but the program has promoted family planning on a voluntary basis for the health and economic benefits that it brings to families. It differs from India and China in that voluntarism has been a strong part of the program. Method choice is restricted primarily to reversible methods, given religious objections to the use of sterilization in most Muslim countries. However, the strong preference for the IUD over the pill (the other method that has been available over the long-term in Egypt) can be traced to (1) the lack of adequate information about how to use other methods, in particular the pill, (2) the greater concerns about the side effects of the pill as compared to the IUD, and (3) the widespread availability of the IUD from multiple sources, including pharmacies, private doctors, and government facilities (Edwards, S., 1994;

Stewart, 1995). The large number of trained physicians in Egypt (comfortable with performing clinical procedures) may also contribute to the disproportionately high use of IUDs.

This brief review in high skew countries indicates that there is no single factor to explain method skew. In certain cases it is clearly strongly influenced by past government policy including use of targets and incentives, which is most often related to sterilization (in the cases of China and India) but may also involve a reversible method (such as the IUD in Vietnam). A second important factor is availability, both current and past. In some African countries it may be a general lack of modern methods. In other countries there appears to be a self-perpetuating cycle of acceptance of a method that has been available and widely used for a long time, such as the case of the pill in Morocco or female sterilization in the Dominican Republic and El Salvador. Yet, this supply factor (availability) at some point converts to a societal preference, through word of mouth communication and satisfied clients. Potential users arrive at the clinic wanting the method that their friend, sister or co-worker uses (Potter, 1999). In the wake of the Cairo Conference, there is even greater effort on the part of providers to give clients the method that they want, which in turn perpetuates the use of the predominant method.

## **V. Discussion**

This article demonstrates the utility of the index of dissimilarity as a macro-level measure of method skew. It meets a number of the criteria for a good indicator: measurable, objective, replicable, and relatively easy to calculate. Moreover, it yields a single quantitative number. ID can be monitored over time using either population-based survey data (as shown in this article) or routine service statistics, provided the latter are reliable. Although the primary use of the

index of dissimilarity to date has been for demographic research on population characteristics, this indicator is of great potential value to family planning practitioners and evaluators. First, it allows donor agencies and others working at the international level to compare countries on the dimension of contraceptive choice. Second, it allows a given country to track its progress over time in reducing method skew. And third, it can be used as an advocacy tool to create awareness and sensitivity among program administrators and other decision makers to the need for a broad range of contraceptive methods.

The ID measures a single but very important element of quality of care: contraceptive choice. Programs that provide good contraceptive choice generally have a diverse method mix, given the widely varying tastes and preferences of clients and the different attributes of the methods themselves (effectiveness, cost, convenience, etc.). Moreover, research has shown that providing clients with their preferred methods results in better contraceptive use and continuation (Pariani, 1991).

Analyses performed in connection with this research and described elsewhere (Rice 2000) point to a useful modification of the original index of dissimilarity for the purpose of measuring method skew. ID is a linear transformation of the average deviation of the seven percentages from the “model” method mix. The recommended modification is to compute a *standard* deviation rather than an *average* deviation from the percentages in the model distribution. In comparison to the average deviation, the standard deviation approach penalizes countries with a single method that deviates from the standard by a large amount in comparison to countries with several methods that deviate from the ideal by a moderate amount. Since “single method

countries” are more likely to reflect limited method choice than countries with a reliance on 2-3 methods, this modified approach should be adopted in calculating method skew.

Despite the potential utility of the ID, there are several caveats that bear mention:

- Many factors affect method choice (Table 1), some of which are outside the control of programs. Moreover, there is no “perfect” method mix. Accordingly, the ID is best used to identify cases of extreme skew (as emphasized in this article).
- Even if a country has one or two methods that predominate there also can be substantial use of other methods. That is, other methods may serve as “in between” methods when couples have recently initiated contraceptive use, when they are switching, or when they are experiencing problems with the “main” methods (Ross, 2000).
- Method mix may change very slowly in any case, despite creditable program efforts. (This is particularly true for sterilization, given the cumulative effect of operations performed in previous years on method mix in any given year.)
- The ID is subject to the limitations of the database upon which it is used. For example, as a general rule DHS data are not collected more than once every 4-5 years in a given country.
- Efforts to monitor and “improve” method mix ought not to be carried out at the expense of good methods that happen to be popular. Rather, program efforts should

- focus on establishing a more “even playing field” of good access and quality of a healthy range of methods.
- The ID as we have defined it uses only seven categories of methods. Programmatic support of certain subcategories or other categories (e.g., female condom, NORPLANT) may also be warranted.
  - The single ID “number” is simply a summary statistic. It is important also to carefully examine the *actual distribution of all methods*, rather than the summary statistic, before undertaking actions to improve method mix or to evaluate such initiatives.
  - The ID as presented in this article may evolve and/or be replaced by even better measures of method skew in the future including other formulations of the “model” distribution.

This work forms part of a larger effort that has developed in the 1990s to measure quality of care for the purposes of program evaluation. Identifying quantifiable, objective measures of quality has been particularly challenging, given the multi-faceted nature of quality of care, as well as the different levels at which quality must be present (at the managerial/infrastructure level and during the provider-client interaction). The subjective nature of “what constitutes quality” and different cultural expectations further complicate the task. Several approaches have been developed that yield quantifiable indicators of quality, the best known of which is the Situation Analysis (SA) developed by the Population Council (Miller et al., 1992). A second instrument

designed to measure quality of care in family planning programs is the QIQ (Quick Investigation of Quality),<sup>16</sup> a less complex methodology developed and tested under the MEASURE *Evaluation* Project in collaboration with the Monitoring and Evaluation Subcommittee of the MAQ. The index of dissimilarity is more limited than the SA and the QIQ, in that it measures the single element of method choice. However, it has the important advantage that it can be calculated from existing data, which is not the case with SA or QIQ.

In conclusion, we recommend further experimentation with indicators and tools to measure quality of care in family planning and reproductive health programs. Whatever the utility of the ID in its current form, the quest for macro-levels indicators of quality should not stop here. We recognize that the ID is only one indicator of quality and that it measures a single element: contraceptive choice. Programs will be best served by using the ID along with other measures of quality in the ongoing pursuit of improving quality and access in programs throughout the world.

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<sup>16</sup> The QIQ is a set of three instruments designed to provide data on a short list of 25 indicators of quality of care in family planning programs. It was developed under the MEASURE *Evaluation* Project, in collaboration with the Monitoring and Evaluation Subcommittee of the MAQ (MEASURE *Evaluation*, 2000).

**Table 1.**  
**Possible Reasons for Contraceptive Method Skew**

**Policies and Programs:**

- Government promotion for certain methods at the expense of others (targets, campaigns etc)
- Regulatory Barriers (e.g. Depo-Provera, sterilization)
- Capability and motivation to mount programs to provide range of methods
- Variety of factors affecting access within service sites (service guidelines, organization of work etc)

**Provider Bias:**

- Provider preferences for specific methods (what's "best" for the client and/or easiest for the provider)

**History:**

- Length of time since introduction of each method in the country (or geographical area)
- Widespread availability leading to familiarity and acceptance among clients, providers and community

**Properties of the methods themselves:**

- Cumulative effect of higher continuation rates for longer-term methods
- Ease of distribution of "non-clinical" methods (through social marketing or community based distribution)
- High program costs for some methods (e.g. Norplant)
- Other method attributes affecting popularity (cost, effectiveness, side effects, ease of use, etc.)

**Client Characteristics:**

- Knowledge of alternative contraceptive methods
- Desire for limiting vs. spacing
- Religious beliefs
- Personal preferences, often influenced by the cultural context
- Age/Life-stage



**Table 2**  
**“Model Method Mix” (the Standard) against which to Measure “Skew”<sup>17</sup>”**

<b>Contraceptive Method</b>	<b>% Using Method (CP &gt; 25%)</b>
Pill	22.2
Female sterilization	21.9
Traditional	17.8
Condom/barrier	14.3
IUD	11.0
Injectable	10.8
Vasectomy	2.1

**Table 3**  
**Ten countries with a contraceptive prevalence greater than 25 percent that comprise the “model method mix”**

<b>Country</b>
Paraguay
Costa Rica
Colombia
Iran
Honduras
Trinidad
Ecuador
Jamaica
Namibia
Bangladesh

<sup>17</sup> “Model” Method Mix” is based on 10 countries with closest to equal distribution on seven methods.

**Table 4**  
**25 Countries with Greatest Contraceptive Method Skew**

<b>Country</b>	<b>(Modified) Index of Dissimilarity</b>	<b>Traditional Methods</b>	<b>Female Sterilization</b>	<b>Pill</b>	<b>IUD</b>	<b>Injectable</b>
<b>Burundi</b>	28.71	✓				
<b>Benin</b>	26.81	✓				
<b>Algeria</b>	26.11			✓		
<b>CAR</b>	25.01	✓				
<b>Togo</b>	23.75	✓				
<b>Congo (DROC)</b>	23.34	✓				
<b>Chad</b>	22.29	✓				
<b>Egypt</b>	22.19				✓	
<b>Kuwait</b>	19.89			✓		
<b>India</b>	19.85		✓			
<b>Mauritania</b>	19.81	✓				
<b>Zimbabwe</b>	19.65			✓		
<b>Eritrea</b>	19.60	✓				
<b>Cameroon</b>	19.08	✓				
<b>Cote d'Ivoire</b>	19.03	✓				
<b>DR</b>	18.14		✓			
<b>Viet Nam</b>	18.05				✓	
<b>China</b>	17.85		✓		✓	
<b>Morocco</b>	17.67			✓		
<b>Rwanda</b>	17.11	✓				✓
<b>Cuba</b>	16.43				✓	
<b>Madagascar</b>	15.96	✓				
<b>Turkey</b>	15.83	✓				
<b>Jordan</b>	15.48				✓	
<b>El Salvador</b>	15.40		✓			

**Table 5. Method Mix and Index of Dissimilarity for Women in Union by Region and Country**

Country	Date	ID	f ster	vasec	pill	inject	IUD	barrier	trad
<b>AFRICA (n=39)</b>									
Burundi	1987	<b>28.71</b>	1.1	0.0	2.3	5.7	3.4	1.1	86.2
Benin	1996	<b>26.81</b>	2.5	0.0	3.1	4.4	3.1	5.0	81.8
Algeria	1995	<b>26.11</b>	0.0	0.0	84.5	0.0	7.7	2.1	5.8
CAR	1994	<b>25.01</b>	2.7	0.0	7.4	4.1	0.7	7.4	77.7
Togo	1988	<b>23.75</b>	4.9	1.6	3.3	1.6	6.5	8.1	74.0
Congo (DROC)	1991	<b>23.34</b>	3.8	0.0	5.1	6.4	1.3	10.3	73.1
Chad	1996	<b>22.29</b>	4.8	0.0	14.3	4.8	0.0	4.8	71.4
Egypt	1997	<b>22.19</b>	2.6	0.0	18.7	7.2	63.5	3.1	5.0
Mauritania	1981	<b>19.81</b>	25.0	0.0	0.0	0.0	0.0	12.5	62.5
Zimbabwe	1994	<b>19.65</b>	4.8	0.4	69.0	6.7	2.1	4.8	12.3
Eritrea	1995	<b>19.60</b>	2.5	0.5	16.7	5.6	4.0	6.6	64.1
Cameroon	1998	<b>19.08</b>	7.7	0.0	10.3	3.6	3.1	11.9	63.4
Cote d'Ivoire	1994	<b>19.03</b>	1.8	0.0	19.3	7.0	2.6	7.0	62.3
Morocco	1995	<b>17.67</b>	8.6	0.0	64.3	0.0	8.6	2.8	15.8
Rwanda	1992	<b>17.11</b>	3.4	0.0	14.4	40.4	1.0	1.0	39.9
Madagascar	1997	<b>15.96</b>	5.2	0.0	12.4	26.4	2.6	4.1	49.2
Niger	1997	<b>15.02</b>	1.2	0.0	34.1	18.3	1.2	1.2	43.9
Ghana	1993	<b>14.51</b>	4.5	0.0	15.8	7.9	4.5	16.8	50.5
Sudan	1993	<b>14.31</b>	10.9	0.0	54.3	0.0	10.9	2.2	21.7
Ethiopia	1990	<b>14.26</b>	7.3	0.0	46.3	0.0	7.3	2.4	36.6
Mali	1995	<b>13.86</b>	4.9	0.0	50.8	3.3	4.9	8.2	27.9
Burkina Faso	1993	<b>13.80</b>	3.8	0.0	26.9	1.3	9.0	11.5	47.4
South Africa	1994	<b>13.47</b>	19.7	2.4	23.8	41.3	3.5	5.4	3.8
Uganda	1995	<b>13.38</b>	9.5	0.0	17.7	17.0	2.7	5.4	47.6
Mozambique	1997	<b>13.33</b>	12.7	0.0	25.5	41.8	5.5	5.5	9.1
Zambia	1996	<b>12.52</b>	7.8	0.0	28.0	3.9	1.6	14.0	44.7
Liberia	1986	<b>12.36</b>	17.2	0.0	51.6	4.7	9.4	3.1	14.1
Libya	1995	<b>11.89</b>	12.5	0.0	25.0	0.0	27.5	0.0	35.0
Botswana	1988	<b>11.71</b>	13.0	0.9	44.8	16.4	17.0	3.9	3.9
Malawi	1996	<b>11.41</b>	11.5	0.0	15.6	29.4	1.8	7.3	34.4

**Table 5. Method Mix and Index of Dissimilarity for Women in Union by Region and Country**

<b>Country</b>	<b>Date</b>	<b>ID</b>	<b>f ster</b>	<b>vasec</b>	<b>pill</b>	<b>inject</b>	<b>IUD</b>	<b>barrier</b>	<b>trad</b>
Nigeria	1990	<b>11.39</b>	5.0	0.0	20.0	11.7	13.3	8.3	41.7
Senegal	1997	<b>11.14</b>	4.0	0.0	26.4	13.6	12.8	4.8	38.4
Lesotho	1992	<b>10.88</b>	4.5	0.0	31.8	0.0	13.6	31.8	18.2
Tunisia	1988	<b>10.28</b>	23.1	0.0	17.7	1.6	34.1	4.6	18.9
Kenya	1998	<b>9.67</b>	15.8	0.0	22.0	32.6	7.0	3.4	19.4
Tanzania	1996	<b>9.49</b>	10.6	0.0	30.6	25.0	3.3	4.4	26.1
Mauritius	1991	<b>8.98</b>	9.6	0.3	28.0	5.5	3.7	18.3	34.5
Namibia	1992	<b>8.84</b>	25.5	0.7	28.6	26.6	7.2	1.4	10.0
Swaziland	1988	<b>8.39</b>	15.6	1.0	28.1	28.1	9.0	4.5	13.6
<b>AMERICAS (n=18)</b>									
Dominican Republic	1996	<b>18.14</b>	65.3	0.2	20.6	0.8	4.0	2.7	6.4
Cuba	1987	<b>16.43</b>	31.4	0.0	14.3	0.0	47.1	2.9	4.3
El Salvador	1993	<b>15.40</b>	59.0	0.7	16.3	6.7	3.9	3.9	9.4
Panama	1984	<b>14.37</b>	55.7	0.7	20.3	1.4	10.3	4.8	6.9
Bolivia	1998	<b>14.29</b>	13.7	0.0	8.0	2.3	23.4	5.5	47.0
Brazil	1996	<b>13.69</b>	52.6	3.4	27.1	1.6	1.4	5.9	8.0
Nicaragua	1998	<b>10.29</b>	43.2	0.8	23.0	8.6	15.1	4.3	5.0
Mexico	1995	<b>10.24</b>	41.3	1.8	12.5	4.6	21.9	5.5	12.4
Guatemala	1998	<b>9.74</b>	43.9	2.1	13.0	10.1	5.7	6.2	19.0
Peru	1996	<b>9.53</b>	14.9	0.3	9.7	12.5	18.8	8.0	35.8
Jamaica	1997	<b>8.76</b>	18.6	0.3	32.1	16.6	1.6	25.9	4.8
Ecuador	1994	<b>8.55</b>	34.8	0.0	17.9	0.0	20.7	4.6	22.0
Trinidad & Tobago	1987	<b>8.19</b>	15.6	0.4	26.6	1.5	8.3	31.9	15.7
Honduras	1996	<b>7.91</b>	36.2	0.0	19.8	0.0	17.0	6.4	20.6
Haiti	1994	<b>6.57</b>	16.7	1.1	16.7	16.1	1.6	21.0	26.9
Colombia	1995	<b>6.48</b>	35.2	1.0	17.7	4.4	15.4	8.4	17.9
Paraguay	1995	<b>4.05</b>	13.4	0.0	26.6	12.2	15.0	14.2	18.7
Costa Rica	1993	<b>5.02</b>	26.3	1.7	24.0	1.3	11.6	21.2	13.9

**Table 5. Method Mix and Index of Dissimilarity for Women in Union by Region and Country**

Country	Date	ID	f ster	vasec	pill	inject	IUD	barrier	trad
<b>ASIA &amp; PACIFIC (n=26)</b>									
Kuwait	1987	<b>19.89</b>	5.8	0.0	69.4	0.0	10.7	5.8	8.4
India	1992	<b>19.85</b>	67.4	8.4	3.0	0.0	4.7	5.9	10.6
Viet Nam	1997	<b>18.05</b>	8.4	0.7	5.7	0.3	51.1	8.0	25.9
China	1992	<b>17.85</b>	42.0	12.0	3.6	0.2	39.6	2.4	0.2
Turkey	1993	<b>15.83</b>	4.7	0.0	7.9	0.2	30.3	11.6	45.3
Jordan	1997	<b>15.48</b>	8.0	0.0	12.4	1.3	44.2	5.5	28.5
Yemen	1997	<b>15.21</b>	6.8	0.5	18.4	5.8	14.5	1.9	52.2
Indonesia <sup>18</sup>	1997	<b>15.05</b>	5.8	0.8	30.0	41.1	15.8	1.4	5.3
Syria	1993	<b>14.62</b>	5.6	0.0	25.0	0.0	39.6	1.3	28.5
Cambodia	1995	<b>14.00</b>	10.7	0.0	10.7	18.9	13.1	0.0	46.7
Nepal	1996	<b>13.53</b>	42.9	19.1	5.0	16.0	1.1	7.1	8.9
Hong Kong	1992	<b>12.61</b>	21.8	1.1	19.5	0.0	5.7	43.7	8.0
Korea	1994	<b>11.64</b>	37.0	15.0	2.3	0.0	13.6	18.5	13.7
Myanmar	1997	<b>11.64</b>	16.9	6.8	22.8	36.0	4.0	0.3	13.2
Taiwan	1992	<b>11.20</b>	33.0	2.0	6.0	0.0	27.0	22.0	10.1
Sri Lanka	1993	<b>10.66</b>	35.6	5.6	8.3	7.0	4.5	5.0	33.9
Malaysia	1984	<b>10.55</b>	14.6	0.4	22.5	1.0	4.3	15.3	41.9
United Arab Emirates	1995	<b>10.13</b>	14.8	0.4	44.3	0.0	14.8	14.8	11.1
Singapore	1982	<b>10.11</b>	30.1	0.8	15.6	9.2	10.9	32.7	1.6
Iraq	1989	<b>10.04</b>	7.4	0.0	37.0	0.0	22.2	11.1	22.2
Thailand	1996	<b>9.75</b>	30.5	2.8	32.0	22.7	4.4	4.3	3.3
Philippines	1998	<b>9.44</b>	22.4	0.0	21.5	5.2	8.0	3.5	39.3
Pakistan	1994	<b>9.28</b>	27.2	0.0	3.8	5.4	11.4	23.9	28.3
Bangladesh	1996	<b>8.85</b>	15.5	2.0	42.4	12.6	3.7	8.1	15.7
Iran	1994	<b>7.35</b>	16.4	1.8	32.6	0.0	11.5	9.7	27.9
Oman	1995	<b>6.95</b>	22.7	0.0	27.3	0.0	9.1	27.3	13.6

<sup>18</sup> Note: Norplant (prevalence = 6.0%) was excluded from the method mix for Indonesia.

**Table 6**  
**Components of Chi Square for Three Countries**

<b>Country</b>	<b>Index Method Mix</b>	<b>Country Method Mix</b>	<b>Components of Chi Square</b>
<b>China</b>			
<b>ID=17.85</b>			
Pill	22.2	3.6	6.2
Female Sterilization	21.9	42.0	3.1
Traditional	17.8	0.2	9.0
Barrier	14.3	2.4	4.5
IUD	11.0	39.6	8.2
Injectable	10.8	0.2	5.5
Vasectomy	2.1	12.0	3.6
<b>Dominican Republic</b>			
<b>ID= 18.14</b>			
Pill	22.2	20.6	0.0
Female Sterilization	21.9	65.3	10.6
Traditional	17.8	6.4	3.0
Barrier	14.3	2.7	3.6
IUD	11.0	4.0	1.6
Injectable	10.8	0.8	4.2
Vasectomy	2.1	0.2	1.0
<b>Benin</b>			
<b>ID= 26.81</b>			
Pill	22.2	3.1	7.2
Female Sterilization	21.9	2.5	7.2
Traditional	17.8	81.8	20.5
Barrier	14.3	5.0	2.1
IUD	11.0	3.1	2.3
Injectable	10.8	4.4	1.6
Vasectomy	2.1	0.0	1.0

**Table 7**  
**Results of Multivariate Analysis: Final Regression Model**

<b>Variable</b>	<b>Coefficient</b>	<b>t statistic</b>	<b>p-value</b>
Access	-.06	-2.84	.01
Latin American Region	-2.88	-2.32	.02
<b><math>R^2 = .21</math> n=72</b>			

**Table 8**  
**Results of Multivariate Analysis: Model Excluding Countries with Contraceptive Prevalence Less Than or Equal to 25 Percent**

<b>Variable</b>	<b>Coefficient</b>	<b>t statistic</b>	<b>p-value</b>
Access	-.08	-2.33	.02
Latin American Region	-3.14	-2.35	.02
<b><math>R^2 = .22</math> n=45</b>			

**Table 9**  
**Correlation between Contraceptive Prevalence and Index of Dissimilarity**

<b>Correlation (n=79)</b>	<b><math>R^2</math></b>	<b>p-value</b>
-.31	.09	.01

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