# METHODS OF EVALUATING FAMILY PLANNING PROGRAMS--WITH SPECIAL REFERENCE TO NORTH CAROLINA (A Preliminary Report)

Elizabeth J. Coulter and B. G. Greenberg University of North Carolina

The recent growth of family planning programs and the medical advances in contraceptive methods bring current needs for evaluating these programs in the community. Related needs for appropriate tools to evaluate family planning programs also arise from the general current interest in measuring effectiveness of health and other government programs in relation to costs to assist in allocation of scarce manpower and other resources.

The purpose of this paper is to discuss some methods of evaluating family planning programs particularly from the standpoint of approaches applicable in the United States. The evaluation process will be illustrated with data for the state of North Carolina which has a history of approximately thirty years of contraceptive services in public health programs.

#### Goals for Evaluation

The aim of evaluation, as considered in this paper, is to determine effectiveness of programs in meeting goals or objectives. The specific goals to be evaluated are likely to vary with the nature of individual programs and the communities they are established to serve.

The purposes of a family planning (contraceptive) service provided under the auspices of a health department were discussed in 1959 by a state health director and his staff in the article by Norton et al (1) with particular reference to North Carolina. They said that the "main purposes for contraceptive service are spacing or prevention of pregnancy for medical and/or socioeconomic considerations and control of excessive population growth." The authors pointed out that the main factors in establishing contraceptive service in North Carolina were medical ones aimed at improving maternal and child health including mortality and morbidity rates. In accord with this some countries (e.g. Chile) have established a national family planning service to counteract the rising mortality resulting from complications of induced abortions.

#### The Evaluation Process

Essentially the process of evaluation involves determination of program effectiveness in fulfilling goals or objectives. The use of statistical methods in the evaluation process should be discussed, however, in the framework of the whole process related to public programming. An isolated study of only those aspects of programming related to evaluation can give a distorted picture. It would, for example, be of little value to the community to measure the fulfillment of goals if the goals themselves were improperly chosen.

This paper will focus attention on four phases that can be followed in the use of statistics in continuous programming. These phases include diagnosis, measurement of services, evaluation, and cost-benefit analysis. The first phase, of diagnosis, is considered here as including program design and goal setting, which might also be discussed as a separate phase of the programming.

# Phase 1: Diagnosis

An important first step in the initiation of a family planning program should be the development of a program design which can be used in allocation of personnel, facilities, and other program resources. This implies measurement of community needs as carefully and completely as circumstances warrant. Specific tools which can be used in measurement and diagnosis of community needs include population censuses and studies, vital statistics rates and ratios, and special surveys of knowledge, attitudes, and practices of the population. The statistical data developed by such means can help in instituting an appropriate program with realistic goals, and in planning various subsequent stages of program operation with appropriate guide-lines and indices to measure progress and development.

#### Phase 2: Measurement of Services

Periodic counts of services provided during the operation of a family planning program are needed to determine the extent to which targets are being met and to provide continuing information on the nature of the services furnished. Program service statistics can be prepared, for example, to show characteristics of persons receiving service, types of service provided, and the time and place of service. Such service statistics plus data on financial costs are useful in themselves for program field staff, administrators, and policy-makers; the service statistics also provide important denominators of inputs needed in the evaluation process discussed in Phase 4, cost-benefit analysis.

# Phase 3: Evaluation

Evaluation should start in the early stages of the program by examination of program details likely to affect results. Early quasi-evaluation steps may involve, for example, consideration of staffing patterns, policy decisions, administrative organization, budgets, community interest, and other factors known to affect program outcomes. The crucial, ultimate questions that must be answered in evaluation relate, however, to the extent to which goals are accomplished, and whether such accomplishments are due solely to the program or to other community forces that cannot be controlled.

# Phase 4: Cost-Benefit Analysis

The fourth phase of programming considers relationships of program gains (or losses) and benefits in accomplishing goals and program costs in terms of personnel, facilities, and other resources. Analyses of such cost-benefit relationships, often called input-output studies, essentially provide ratios of certain measures of accomplishments in phase 3 to selected indices or measures of service chosen from phase 2.

# Diagnosis

Numerous types of information about the community are of potential use in setting goals of family planning programs and determining allocation of resources to meet these goals. Potentially useful data include, for example, statistics on personal and socioeconomic characteristics of the population; fertility patterns; knowledge, attitudes, and practices with respect to family planning and means of implementing it; morbidity and mortality rates, and geographic differences in the population characteristics. Some of the required information is usually readily available from such sources as population censuses, vital statistics, and records of health and other government agencies. Special surveys are likely to be necessary to obtain other types of needed information, especially on knowledge, attitudes, and practices with respect to family planning and means of implementing it.

Several examples relating to the population of North Carolina will illustrate uses and sources of various types of community data in setting goals of family planning programs and guiding their subsequent development. The total population of the state used for illustrative purposes was approximately four and a half million in 1960. Approximately one fourth of the population was nonwhite. (Table 1)

Data on personal characteristics and marital patterns of the population of North Carolina show important color differences in marital status of women in the child-bearing ages. Statistics from the U. S. Census bring out the fact that in 1960 relatively larger proportions of the nonwhite than of the white women of child-bearing age were single, e.g. 42.2 per cent of the nonwhite women and 22.6 per cent of the white women at ages 20-24 years. (Table 1) Such data suggest possible contraceptive needs for single as well as married women. These needs will appear in subsequent statistics on fertility patterns.

Major differences in socioeconomic characteristics of white and nonwhite persons in North Carolina also have important program implications. The 1960 Census statistics show, for example, median family income of \$1992 for nonwhite and \$4588 for white families, and higher unemployment rates among nonwhites than among whites in the labor force. (Table 1) Such data bring out the fact that considerably higher proportions of nonwhite than of white women can be expected to have need of public family planning services designed to provide free or low cost care for those of limited income.

Statistics on natality and fertility patterns in the population are of fundamental importance in development of family planning programs--as well as subsequent evaluation of their effectiveness. Data from 1960 vital statistics for North Carolina show, for example, that birth rates were relatively high among women 20-29 years of age. Color comparisons show that the birth rates were higher among nonwhite than among white women at each of the age groups from 15 through 44, and the excess among the nonwhites was relatively large at ages 15-19 and especially over 30 years. It is particularly interesting to note that the nonwhite women started their child-bearing at relatively younger ages than the white women even though their first marriage tended to occur at older ages, and that the nonwhites had shorter intervals than whites between births of lower birth orders. Illegitimacy rates were in turn considerably higher among nonwhites than among whites. Comparisons by birth order show that in 1960 the excess fertility among the nonwhites compared with the whites was concentrated at birth orders of three or more, and increased considerably in relative magnitude at higher birth orders. (Table 2)

The marriage, natality, and fertility patterns noted for North Carolina suggest several groups in the female population of child-bearing age with potential special needs for family planning service. Specific groups include, for example, mothers in ages of high fertility from 20 to 29 years who may wish help in spacing children, single nonwhite women, and women with several children.

Statistics on knowledge, attitudes, and practice with reference to family size and contraceptive use provide further indication of needs for family planning service, e.g. by giving information about population desires and attitudes with reference to changes in fertility patterns. Recent interview surveys of adult males and females in four low income areas in two North Carolina cities with active family planning (contraceptive) programs and nine low income areas located in four North Carolina counties without large cities but with public contraceptive programs a/ bring out the interesting fact that the mean ideal number of children for each color group and each area ranged from 2.7 to 3.7. The ideal number of children was in some instances lower for nonwhites than for whites even though a reverse fertility pattern has been noted by color. The proportion of respondents who approved of birth control was

somewhat higher than the proportion disapproving in the urban study areas and in five of the nine more rural study areas - with a considerable number of respondents in unknown or "it depends" categories with reference to approval or disapproval. The proportion of respondents specifying approval of birth control generally increased with education. (2)

High overall rates of infant, perinatal and maternal mortality in earlier decades of this century as well as excessive rates of such mortality in nonwhite and low socioeconomic population groups have been important factors in the development of public family planning (contraceptive) services in North Carolina. (1) Recent data on infant mortality rates in North Carolina give reasons for continued concern. Statistics for the State for the period from 1960 through 1966 (Figure 1) show, for example, the following:

- Since 1960 infant mortality (both neonatal and postneonatal) has shown little decline in either the white or nonwhite races. This "may" suggest that family planning is needed to help raise the level of home environment conducive to survival.
- (2) Among nonwhites the postneonatal contribution is almost as great as the neonatal portion. This definitely suggests that in the later period when the mother may be pregnant with her subsequent child she has limited time, energy, and resources to devote to the infant under one year of age. The question arises: can family planning help reduce the postneonatal mortality rates?

Additional statistics on infant and neonatal death rates by birth order, legitimacy status, and color for North Carolina for the years 1959-1961 show considerable excess in such mortality among high birth order, illegitimate, and nonwhite births. (Table 3) These data give further indications of special groups with potential needs for family planning services, such as mothers with several prior children.

Further classification of population and vital statistics by geographic area helps in more specific identification of population groups in need of family planning services. Classifications for North Carolina show, for example, higher income levels but lower fertility rates for metropolitan counties than for less urbanized areas of the State. (3), (Table 6) Such data also show that the illegitimacy problem among the whites is more concentrated in large cities than in other areas of the State while the illegitimacy problem for nonwhites is similar for the cities and the remainder of North Carolina. (4) Census tract statistics for individual cities, such as Charlotte and Raleigh, have also helped to identify low income problem areas of potential program concern.

# Measurement of Services

Service statistics collected throughout the development of a family planning program are of considerable use in determination of the extent to which the program is reaching various groups in the community and in subsequent evaluation of program impact on fertility patterns and the general health and well-being of the population. Such service statistics can also be used to consider the most effective combination and location of personnel and material resources and in studying costs in relation to service patterns.

There are several types of potentially useful information about each person served in a family planning program. Specific examples include data on personal and socioeconomic characteristics of persons served, source of referral, prior contraceptive use, method of contraception prescribed, and dates of clinic visits or other contacts with patients. Additional data on personnel, material, and other resource requirements and their costs are also useful.

Several examples of service statistics obtained in public family planning (contraceptive) programs in North Carolina will illustrate some potential uses of such statistics. Historic statistics show that the annual reported numbers of patients receiving contraceptive service through health departments in the State fluctuated from approximately two to four thousand over the period from 1940 through 1963 and then increased sharply to reach 16,516 in 1966. The reported number of persons served has recently shown considerable concentration in several counties, notably Mecklenburg (which includes the city of Charlotte) and to a lesser extent Cumberland (including the city of Fayetteville), Durham, and Forsyth (with the city of Winston-Salem). (1.5)

The relatively old, large Mecklenburg program had a sharp increase in new admissions following the introduction of pills in late 1960 and the intra-uterine devices (IUDs) in 1964. (Table 4) A peak for new admissions was, however, reached in 1965 and a marked decline in new admissions has since occurred. The recent decline in new admissions raises questions about numbers, location, and characteristics of persons interested in family planning who have not already been reached. It is of interest to note in this connection that the Mecklenburg Welfare Department has a program of using homemakers, commonly called "doorknockers", who "have been active since July 1, 1964 in canvassing low socioeconomic status neighborhoods and in following individual leads to women who might benefit from family planning". (6)

Recent service statistics for new admissions to family planning programs operated by health departments in three urban counties in North Carolina show several indications that the programs have reached population groups of special need. The data are for the Mecklenburg program (for the period November 1960 to July 1966), the Cumberland program (for the period August 1963 to July 1967) and a relatively new program in Wake County, which includes the city of Raleigh (for the period March 1966 to June 1967). The data for the three programs (Table 5) show specifically that:

- All three programs had high proportions of nonwhite patients--ranging from 80 per cent for Mecklenburg to about two-thirds for Cumberland.
- (2) Each of the programs admitted primarily young women in the ages of relatively high fertility, i.e. under 30 years.
- (3) All three programs admitted considerable numbers of single women-following the birth of the first child. Thirty-eight per cent of the nonwhite admissions to the Wake County program were single while 27 per cent of the nonwhites admitted to the Mecklenburg program were single.

It is also of interest to note that one-third of the admissions to the Wake County program were on welfare funds while most of the admissions to the Mecklenburg program were from low income census tracts in the city. (7, 8)

Data by age and parity for white and nonwhite admissions to the Mecklenburg and Wake County programs also suggest some differences in program emphasis in reaching population groups of particular need. (Table 5) Comparisons of the nonwhite admissions to the two programs show, for example, relatively high proportions of the 15-19 year old and single parity women in the Wake County program. The Mecklenburg program included relatively high proportions of nonwhites in the ages from 20 through 29 years and at several of the higher parities. It is also relevant to point out that there was a marked decline in age and parity of new admissions to the Mecklenburg program over the study period from November 1960 to July 1966 (6,8). Hence the two programs are currently more similar than would appear from an analysis only of Table 5.

Comparisons of the Mecklenburg, Wake, and Cumberland programs also show a difference in the method of contraception used, which may affect the length of time patients continue contraceptive usage. The Mecklenburg program has relied heavily on the pills, prescribed for 65 per cent of the white and 80 per cent of the nonwhite new admissions, for whom pills or IUDs were prescribed, over the period from November 1960 to July 1966. (8) The IUDs were used almost four times more frequently than the pills for new admissions to the Wake County program from March 1966 through May 1967 (7), and the Cumberland program has recently used the IUDs almost exclusively. The higher usage of pills in Mecklenburg is not one of time although the pill was available earlier (Table 4).

Follow-up data showing the extent to which persons admitted to a family planning program subsequently drop out for such reasons as pregnancy, discontinued interest, death, or migration from the community are also important for administrative purposes as well as subsequent evaluation of program impact on fertility rates. Illustrative statistics for 458 women fitted with IUDs in the Mecklenburg IUD program in 1964 and followed to mid-1966 show, for example, that 88.9 per cent were still active in the IUD program six months after enrollment in it and 79.5 per cent were active at the end of 12 months. The subsequent six months showed a smaller rate of decline and about 74.7 per cent were still active users after 18 months. b/(9)

# Evaluation

Three general types of measures can be used to evaluate effectiveness of family planning programs at various lengths of time after the initiation of services. Specifically it is of interest to consider:

- (1) Early detectable changes in knowledge, attitudes, and practices with reference to contraception and family planning service.
- (2) Subsequent effects on natality and fertility patterns, by such classifications as color, age, and parity.
- (3) Possible long-range benefits of improved physical or mental health of the mother; lower divorce rates, reduced prematurity and illegitimacy rates; lower maternal, infant, neonatal or fetal mortality rates; higher levels of income and employment, and lower rates of juvenile delinquency.

Changes in knowledge, attitudes, or practices may occur within the first year of the program. Changes in fertility patterns may take up to several years to appear, while some of the longrange benefits of improved health and well-being may not appear for a number of years.

Community surveys at two or more points in time provide a potential means of determining changes in knowledge, attitudes, and practices arising from the initiation of family planning programs. Selected data from clinic records of family planning programs also provide some clues to changes in knowledge, attitude, or practice. Data from the Mecklenburg program clinic records for newly admitted patients over the period from November 1960 to July 1966 show, for example, that only two per cent of the nonwhite and nine per cent of the white patients who accepted pills as a method of contraception through the program had previously used pills. About 30 per cent of the white and 23 per cent of the nonwhite new admissions for whom pills or IUDs were prescribed by the program over the period from November 1960 to July 1966 reported previous use of condoms. (8)

Two different types of approaches can be taken in considering effects of family planning programs on fertility. One approach is to consider use effectiveness of contraceptives among program participants themselves. (10, 11) This involves following women accepting a contraceptive over time to determine periods of protection or exposure and rates of pregnancy or discontinued use for this reason. Another approach to the effect on births is to study various measures of natality and fertility in the community. The latter is, of course, a less sensitive indicator since the denominator includes many nonparticipants. There is a related need in both types of approaches to consider changes in fertility that might have occurred in the absence of the family planning program. For this reason simultaneous control groups or communities are frequently used in such studies.

Fertility rates in the state used for illustrative purposes, North Carolina, declined over the period 1961 through 1966. The decline has been greater in high than in low birth orders, especially among the nonwhites. (12) (Tables 2 and 6) Further study is needed with reference to the possible role of public family planning programs, privately obtained contraceptives, and other factors in the communities of the State in the fertility decline.

Table 6 provides fertility rates for the years 1963-1966 for three metropolitan counties in the State: Mecklenburg and Wake, with family planning programs already discussed, and Guilford, which includes the cities of Greensboro and High Point and has little public family planning service. A considerable drop occurred in the nonwhite fertility rate among residents of Mecklenburg County in 1965 and was followed by a somewhat smaller decline in fertility for this population group in 1966. Neither of the other two counties showed the drop in nonwhite fertility rates in 1965 of the same magnitude as found for Mecklenburg. The white fertility rate for Mecklenburg also failed to show as much decline as the nonwhite rate in 1965 although an interesting earlier decline in the white rate occurred in 1964. As previously noted, there was a sharp increase in new admissions, predominantly nonwhite, to the Mecklenburg family planning program in 1964 and some further increase in new admissions to the family planning program occurred in 1965. (Table 4)

Nonwhite birth rates for Mecklenburg County show that age groups from 20 to 29 years contributed particularly to the decline in nonwhite fertility rates in the county from 1964 to 1965. The decline in birth rate was approximately 22 per cent in each of the fertile age groups of 20-24 and 25-29 years. Smaller declines occurred at ages 30-34 and 15-19 years (18 and 12 per cent, respectively), while little change occurred in birth rates at ages 35-44 years. (Table 7) It is especially interesting to note in studying the data on birth rates by age group that over half of the nonwhite new admissions to the Mecklenburg family planning program in each of the years 1961 through 1965 were from age groups of 20-29 years. (6, 8)

Readily available illegitimacy statistics for North Carolina provide one means of evaluating possible long-term effects of family planning services on the health and well-being of the population. Dr. Elizabeth Corkey noted in a recent article (13) about the Mecklenburg program that a small relative decline in illegitimate births beyond the first occurred for Mecklenburg County during the period 1955-1964--from 49.7 to 44.6 per cent of all illegitimate births. Data on nonwhite illegitimate births for Mecklenburg County residents over the years 1963 to 1966 also show a recent decline in illegitimate births of higher order, especially of five or more, in contrast to an increase of illegitimate first births in 1964 and again in 1966. (Table 8) It is of special interest to note here that the Mecklenburg family planning program has not accepted single women unless they have had at least one birth. It is also relevant that the health and welfare agencies in Mecklenburg County have arrangements to try to reach and discuss possible family planning or other needs of mothers who have had over three illegitimate births, under a state law requiring special consideration of these mothers from the standpoint of the well-being of the children.

Perinatal and late infant mortality rates have also been studied in North Carolina with reference to possible benefits of family planning services. Norton et al, in 1959, noted (1) considerable reduction in perinatal and late infant mortality rates in the State, as well as sharp reductions in maternal mortality rates, in studying the period of the first twenty-one years of experience with a public contraceptive service in North Carolina. They pointed to difficulties in determining the precise role which the contraceptive service of itself exercised in the decline but suggested that such service was nevertheless contributory.

Recent perinatal and postneonatal mortality rates are available in Table 9 for the three urban North Carolina counties for which fertility rates were previously considered: Mecklenburg, with the large family planning program serving particularly nonwhites; Wake, with a relatively newer and smaller program, and Guilford, which does not have a large public family planning program. It is particularly interesting to note that the nonwhite perinatal mortality rate for Mecklenburg County showed a marked decline in 1965 (the same year that the nonwhite fertility rate dropped considerably for the county) and continued to be relatively low in 1966. The white perinatal mortality rate of the county, on the other hand, showed little change over the years 1963-1966. The nonwhite perinatal mortality rate of Wake County also generally showed little change over the period while the nonwhite rate for Guilford has shown some recent decline. Therefore, further study of perinatal and postneonatal death rates within census tracts or neighborhoods of urban counties would be of potential interest, particularly if these can be related to the areas in which the program

participants reside. Previously noted high infant death rates among illegitimate and higher order births (Table 3) also suggest that it would be especially interesting to consider possible effects of reduced fertility rates that may occur in these high risk groups on infant mortality rates.

# Cost-Benefit Analysis

Analyses of relationships of costs and benefits of family planning programs provide evaluation tools which are particularly important in view of scarcities of human and physical resources to meet the many types of needs in our society. Such analyses include studies of program outputs in fulfilling goals relative to program inputs of personnel, facilities, and other resources. Some of the costs and benefits can be measured in monetary terms; others may require alternative measures, such as number of specified services.

Numerous types of analyses can be made to relate costs and benefits of family planning programs. Administrative studies can, for example, be made to determine best or least expensive combinations of program resources in producing specified results, such as months of protection. Related consideration can also be given to costs of various types of care to the patient, e.g. for transportation to a clinic. There also are many possibilities for study of program benefits or outputs, e.g. in improved health of the mother and child or reduced social problems in the community, in relation to the program costs.

Administrative studies can be made to consider both clinic and other program inputs in relation to specific benefits for the patients. Comparisons of clinic costs per months of protection can, for example, be made by individual clinic, single vs. dispersed clinics, year of program operation, type of contraception prescribed, various combinations of professional and nonprofessional staff, and different combinations of personnel time and educational materials. Other costs to be considered include personnel time required to inform potentially interested persons of available services, and services needed to follow up persons who drop out of the program.

Several types of costs which the patient may incur in coming to the clinic are also relevant. These costs include expenses of transportation, time required to come to the clinic, and associated expenses of child care or hours lost from work. Such costs need to be considered in relation to outlays of funds for the program itself, and to attrition rates. Extra program costs for initial or early clinic visits may, for example, be justifiable if they help reduce costs to the patients and subsequently reduce drop-outs from the program.

The scope of the potential benefits of family planning programs that have already been discussed present many challenges for determina-

tion and measurement of program outputs in relation to given inputs or costs. Indices of changes in fertility, improved health or reduced disability, higher levels of education, reduced juvenile delinquency, and other social and community benefits provide possible measures of a non-monetary nature that can be studied. Some of these benefits can also be related to potential economic savings or returns for the population and the community. Reduced disability provides, for example, potential for more productive activities, such as household duties of the mother, and lower medical expenses; improved general health and education levels of the family members give potentials for better employment and in turn higher income; and reduced infant or maternal mortality help save infants and mothers for subsequent years of productive life. Approaches taken by Dublin and Lotka in their book on The Money Value of a Man and more recently by writers such as Fein, Weisbrod and Rice (14-17) present possibilities for measuring economic costs of premature death prior to productive years, lost productivity or income due to disability, and expenses of medical care which are of potential use in measuring economic benefits of family planning, as well as other health services.

This discussion of cost-benefit approaches is intended only to suggest some of the possibilities for applications in family planning programs. The authors are pursuing further work on cost-benefit analyses and expect to publish the results subsequently. An example from the Mecklenburg County family planning program will illustrate, in a preliminary way, a possibility for studying service required in relation to months of protection from pregnancy. Data for 447 women fitted with IUDs in the program in 1964 and remaining active for at least six months c/ show that they had an average of 4.7 contacts with the program, by clinic visit, home visit, or phone call, during the first six months in the IUD program. The average number of program contacts was higher than the regularly scheduled three clinic visits in the first six months for patients for whom IUDs were inserted in 1964 d/, and is higher than one would expect in subsequent months after insertion of the IUD. Additional data for the group of 447 women fitted with IUDs in 1964 and remaining in the program for at least six months show that those who became inactive before July, 1966, had more program visits in the first six months than those who remained active to July, 1966. Specifically, one fourth of the 447 women who became inactive had an average of 5.3 program contacts in the first six months compared with an average of 4.5 program contacts for the three-fourths who remained active. (9) Such data suggest possibilities for further study of visits and costs for family planning program participants, who can in turn be classified by characteristics, type of contracep-tive, and length of participation in the program.

#### Conclusion

The potential relationship of family planning programs to many facets of the complex, ever changing American society present many challenges for continuing development of techniques for evaluating such programs. The challenges for appropriate methodologic approaches relate to the various steps in the programming process from collection of information on characteristics of the community population through study of program services and subsequent consideration of program accomplishments--as well as their relation to program costs. It will be especially useful, at this stage, to have further experience with applications of the evaluation techniques in various types of communities in the United States and careful analyses of results of such experience.

#### Footnotes

- a/ The survey population included half of the adult household members of both sexes who were 18 years of age or older. The adults to be interviewed were selected at random in each household in a sample consisting of at least 400 households in most of the study areas.
- b/The group of 458 women consisted of all those fitted with intra-uterine devices during the first year (1964) these devices were provided by the program, except for those served in a small clinic in an outlying area of the county and a few for whom limited information was available. Approximately 80 per cent of the 458 women were new admissions to the Mecklenburg program in 1964. The group of women studied had slightly higher drop-out rates, due to accidental pregnancies, than one might generally expect recently because of the use of small IUDs later discontinued by the program.
- C/The group of 447 women consisted of the 458 women to whom reference is made in footnote b with the exception of 11 women lost to follow-up by the program in less than six months.
- d/Subsequently the program has reduced the number of scheduled visits in the first six months to two--an initial and one follow-up visit.

#### References

- 1. Norton, J. W. R., Donnelly, J. F., and Lamb, A., Twenty-One Years Experience with A Public Health Contraceptive Service, <u>American Journal of Public Health</u>, 49 (1959), 993-1000.
- North Carolina Fund, The North Carolina Fund Survey of Low Income Families in North Carolina, Reports on <u>Characteristics of</u> <u>Individuals, 1967, 3b, pp. 37-39; 3c,</u> <u>pp. 43-45; 3e, pp. 41-42; 3f, pp. 41-42;</u> <u>3g, pp. 46-48.</u>

- 3. U. S. Department of Commerce, Bureau of the Census, U. S. Census of Population: 1960, General Social and Economic Characteristics, North Carolina, Final Report PC (1) - 35C, pp. 216-220 and 276-284, U. S. Government Printing Office, Washington, D. C.
- 4. North Carolina State Board of Health, Epidemiology Division, <u>Annual Report of</u> <u>Public Health Statistics Section, 1960</u>, Part 2, pp. 97, 99, 101, 103, and 105, Raleigh, North Carolina.
- 5. Special tabulations provided by the North Carolina State Board of Health.
- Siegel, E., Tuthill, R., Coulter, E., Chipman, S., and Corkey, E., A Longitudinal Assessment of A Community Family Planning Program, accepted for publication in the American Journal of Public Health.
- Omran, A. R., Arnold, C. B., Wells, H. B., and Bethel, M. B., <u>Selected Demographic Data</u>, Wake County, North Carolina. (Mimeographed)
- Special tabulations prepared as part of a study by the Department of Maternal and Child Health and the Carolina Population Center of the University of North Carolina, with the cooperation of the Mecklenburg County Health Department.
- 9. Talwar, P. P., Family Planning through IUD Clinics in the Mecklenburg County Health Department in the Year 1964, summer field training report prepared in work with Dr. Elizabeth C. Corkey and Mrs. Marian Haslam of the Mecklenburg County Health Department.
- Potter, R. G., Jr., Additional Measures of Use Effectiveness in Contraception, <u>Milbank</u> <u>Memorial Fund Quarterly</u>, XLI (1963), <u>400-418</u>.
- 11. Tietze, C., Intra-Uterine Contraception: Recommended Procedures for Data Analysis, <u>Studies in Family Planning</u> 18 (Supplement), (1967), 1-6.
- 12. (a) North Carolina State Board of Health, Epidemiology Division, <u>Annual Report of</u> <u>Public Health Statistics Section</u>, 1960, Part <u>2</u>, p. 15; 1961, Part 2, p. 15; 1962, Part 2, p. 15; 1963, Part 2, p. 15; and 1964, Part 2, p. 15, Raleigh, North Carolina.
  (b) North Carolina State Board of Health, Division of Epidemiology, Public Health

Division of Epidemiology, Public Health Statistics Section, North Carolina Vital Statistics, 1965, Part 2, p. B-7; 1966, p. 50, Raleigh, North Carolina.

- Corkey, E. C., The Birth Control Program in the Mecklenburg County Health Department, <u>American Journal of Public Health</u>, 56, Part II, (1966), 40-47.
- 14. Dublin, L. S. and Lotka, A. J., <u>The Money</u> <u>Value of A Man</u>, The Ronald Press Co., New York, 1946.

- Fein, R., Economics of Mental Illness, Basic Books, New York, 1958.
- Weisbrod, B. A., <u>Economics of Public Health</u>, University of Pennsylvania Press,

Philadelphia, 1961.

 Rice, D. P. and Cooper, B. S., The Economic Value of Human Life, <u>American Journal of</u> <u>Public Health</u>, 57 (1967), 1954-1966.

TABLE	1.	-	Selected	Characteristics	of	the	White	and	Nonwhite	Population	of
				North Card	olin	a, 1	1960				

Population Characteristics	White	Nonwhite
Total Population <u>a</u> /	3,399,285	1,156,870
Distribution by Color <u>a</u> /	74.6	25.4
Proportion in Ages Under 18 Years <u>a</u> /	35.0	46.1
Proportion of Women Who Were Single (Not Previously Married) at Ages <u>b</u> /		
15-19	78.4	87.6
20-24	22.6	42.2
25-29	7.6	19.8
30-34	5.0	12.2
35-39	5.1	9.1
40-44	5.1	8.0
Median Family Income <u>c</u> /	\$4588	\$1992
Per Cent of Civilian Labor Force Unemployed <u>d</u> /		
Male	2.9	6.0
Female	4.9	9.6

#### Sources:

- Based on data in U.S. Department of Commerce, Bureau of the Census, U. S. Census of Population: 1960, General Population Characteristics, North Carolina, Final Report PC (1) - 35 B, pages 38 and 39. U.S. Government Printing Office, Washington, D. C.
- <u>b/</u> Based on data in U. S. Department of Commerce, Bureau of the Census, U. S. Census of Population: 1960, Detailed Characteristics, North Carolina, Final Report PC (1) - 35 D, pages 363-365, U. S. Government Printing Office, Washington, D. C.
- C/ U. S. Department of Commerce, Bureau of the Census, U. S. Census of Population: 1960, General Social and Economic Characteristics, North Carolina, Final Report PC (1) - 35 C, page 181, U. S. Government Printing Office, Washington, D. C.
- <u>d</u>/ Ibid., page 172.

Population Characteristics	White	Nonwhite
Age Group	Age	Specific Birth Rates, Ages 15-44 a/
Total Ages		
15-44	101.8	148.6
15-19 20-24 25-29 20-24	90.4 220.0 161.4	140.7 281.4 215.3
35-39	41.8	80.8
40-44	11.4	23.9
Live Birth Order	Fert	Tility Rates by Live Birth Order $1/a/$
All Birth Orders	101.8	148.6
1	30.6	29.8
2	26.9	24.9
3	18.8	20.3
4	11.5	17.1
5	6.4	14.4
6	3.4	11.3
7 and over	4.3	31.0
Live Birth Order	Mean Age c	of Mother at Specified Live Birth Order b/
1	21.6	19.5
2	24.6	21.8
3	27.1	24.0
4	29.0	25.8.
5	30.5	27.5
6	31.6	29.2
Total Births	Percentage	e of Live Births That Were Illegitimate <u>c</u> /
Total	2.3	24.5

TABLE 2. - Selected Natality and Fertility Rates Among White and NonwhiteFemale North Carolina Residents 15-44 Years of Age, 1960

1/ Statistics include fetal deaths in determining birth order. Fetal deaths accounted for approximately 1.5 per cent of the white deliveries and about 3 per cent of the nonwhite deliveries.

#### Sources:

- a/ Based on natality data in North Carolina State Board of Health, Epidemiology Division, Annual Report of Public Health Statistics Section, 1960, Part 2, page 15, Raleigh, North Carolina, and population data in U. S. Department of Commerce, Bureau of the Census, U. S. Census of Population: 1960, General Population Characteristics, North Carolina, Final Report PC (1) - 35 B, pages 39 and 40, U. S. Government Printing Office, Washington, D. C.
- <u>b</u>/ Based on data in North Carolina State Board of Health, Epidemiology Division, <u>Annual Report of the Public Health Statistics Section, 1960</u>, Part 2, page 15, Raleigh, North Carolina.
- C/ Based on data in North Carolina State Board of Health, Epidemiology Division, <u>Annual Report of Public Health Statistics Section</u>, 1960, Part 2, page 97, Raleigh, North Carolina.



Figure 1. Infant, Neonatal, and Postneonatal Death Rates per 1,000 White and Nonwhite Live Births, North Carolina, 1940-1966.

Source: Reproduced from North Carolina State Board of Health, Division of Epidemiology Public Health Statistics Section, North Carolina Vital Statistics, 1966, page 4, Raleigh, North Carolina.

Birth	Infan	t Deaths	Neonata	Neonatal Deaths				
Order	Legitimate	Illegitimate	Legitimate	Illegitimate				
		W	hite					
1 2 3 4-5 6-7 8-9	18.4 21.6 21.2 25.0 32.4 34.9	43.8 69.5 88.1 76.2 98.4* 155.6*	14.5 16.9 16.6 18.3 24.6 24.2	28.4 43.9 51.1* 24.4* 49.2* 111.1*				
	40.5	Non	white	133.3*				
1 2 3 4-5 6-7 8-9 10+	38.1 45.0 44.5 45.1 49.1 52.3 56.0	51.7 64.6 74.5 71.6 80.8 91.2 104.3	24.9 25.1 24.1 23.6 27.9 31.6 34.0	28.6 32.1 36.7 35.8 33.1 44.8 55.2*				

# TABLE 3. - Infant and Neonatal Death Rates per 1000 Live Births by Birth Order, Color, and Legitimacy Status, North Carolina Residents, 1959-1961 1/

 $\frac{1}{}$  Fetal deaths were included in determining birth order. The fetal deaths accounted for approximately 1.5 per cent of the white deliveries and approximately 3 per cent of the nonwhite deliveries.

\* Rates are based on less than 20 deaths.

# Source:

Based on data in: Suksawasdi, R.; The Study of Probability of Survival of Legitimate and Illegitimate Infants Born to Residents of North Carolina, 1959-1961, summer field training report prepared in work with Mr. Glenn A. Flinchum and Mr. Bradford W. Johnson of the North Carolina State Board of Health.

Year	Total	Pills	Intra-Uterine Devices
Total	4514	3493	1021
1960 (October and			
November) and 1961	89	89	
1962	212	212	
1963	314	314	
1964	1054	689	365
1965	1250	912	338
1966	754	612	142
1967	841	665	176

TABLE 4. - Total Number of New Admissions to the Mecklenburg County Family Planning Clinic for Whom Pills and Intra-Uterine Devices Were Prescribed, November 1960 through December 1967 1/

# $\frac{1}{2}$ The data exclude admissions to a small clinic in an outlying area of the county. Services in this clinic are omitted throughout this paper.

# Source:

Data are from the following article: Siegel, E., Tuthill, R., Coulter, E., Chipman, S., and Corkey, E., A Longitudinal Assessment of A Community Family Planning Program, accepted for publication in the <u>American Journal of Public Health</u>.

TABLE 5. - Age, Parity, and Marital Status Distribution of White and Nonwhite New Admissions to Family Planning Programs in Mecklenburg, Wake, and Cumberland Counties, North Carolina, Specified Years in the 1960's 1/

Characteristics of	Mecklenburg ber 1960-Ju	g Program, Novem- me 1966 <u>2</u> /	Wake Pro 1966-May	ogram, March y 1967	Cumberland Program, August 1963-June 1967 <u>3</u> /						
New Admissions	White	Nonwhite	White	Nonwhite	White	Nonwhite					
	Number of New Admissions										
Total	663	2677	85	230	537	1036					
			Per Co	ent							
Age Group											
Total	100.0	100.0	100.0	100.0	100.0	100.0					
Under 15 15-19 20-24 25-29 30-34 35-39 40 and over Mean Age	0.0 22.2 37.0 23.5 9.6 5.3 2.4 24.8	0.6 22.2 36.2 21.8 10.8 6.5 1.9 24.9	0.0 17.6 33.0 28.2 9.4 5.9 5.9 26.0	2.2 30.9 32.6 14.3 11.3 7.0 1.7 24.0	0.4 10.9 34.7 27.9 15.7 7.0 3.4 26.6	1.3 22.2 37.7 21.6 11.6 4.3 1.3 24.4					
Parity 4/					All Cold	ors Combined					
Total	100.0	100.0	100.0	100.0	100	0.0					
0 1 2 3 4 5 6 7 8 or more	3.6 20.5 25.4 26.9 12.3 6.6 2.6 0.9 1.2	1.2 19.5 20.8 18.1 13.9 9.3 6.4 4.2 6.6	2.4 23.5 24.6 22.4 15.3 4.7 1.2 3.5 2.4	1.3 30.3 18.3 16.1 9.6 8.3 4.8 2.6 8.7	1 17 20 19 14 11 6 3	0 7.0 9.2 9.1 4.5 1 5.0 3.9 7.2					
Marital Status					All Cold	ors Combined					
Total	100.0	100.0	100.0	100.0	100	0.0					
Single Married Widowed Divorced or Separated	2.0 93.1 0.2 4.7	27.0 57.5 1.3 14.2	5.9 91.8 0 2.3	37.8 54.3 4.8 3.1		5.8 2.3 ).1					

<sup>1</sup>/ Small numbers of patients of unknown age, parity, or marital status were excluded in calculating percentage distributions for specific characteristics for which unknowns appeared.

 $\frac{2}{2}$  Data are limited to patients for whom pills or IUDs were prescribed, which results in exclusion of a very small number of new admissions to the program.

3/ The nonwhite admissions included 43 Indians. There were 21 admissions of unknown color which were excluded in calculating the distribution by age; tabulations by color were not available for the parity and marital status distributions.

4/ Somewhat different procedures were used in determining "parity" for the individual programs. A total of 163 premature births as well as the abortions and stillbirths were excluded for the Mecklenburg program; data for the Wake County program are for living children, and statistics for the Cumberland program include prior fetal deaths as well as live births in determining parity.

# Sources:

Statistics for the Mecklenburg program are from special tabulations prepared as part of a study by the Department of Maternal and Child Health and the Carolina Population Center of the University of North Carolina with the cooperation of the Mecklenburg County Health Department. Data for the Wake County program are from a mimeographed report: Omran, A. R., Arnold, C. B., Wells, H. B., and Bethel, M. B., <u>Selected Demographic Data, Wake</u> <u>County, North Carolina</u>. Statistics for the Cumberland program are from special tabulations provided by the North Carolina State Board of Health.

	Geographic Area											
Year	North	Mecklenburg	Guilford	Wake								
	Carolin <b>a</b>	County	County	County								
		Wh	nite									
1963	97.0	91.8	85.7	89.0								
1964	94.8	84.1	81.5	91.0								
1965	86.1	76.2	75.5	78.4								
1966	82.7	73.7	71.6	78.0								
<u> </u>		Nonw	white									
1963	143.7	139.2	125.9	138.6								
1964	142.9	139.2	126.0	130.1								
1965	133.4	115.9	120.2	129.6								
1966	120.9	107.1	108.6	118.3								

TABLE 6. - Fertility Rates per 1000 White and Nonwhite Females 15-44 Years of Age, North Carolina and Selected Counties, 1963-1966  $\frac{1}{2}$ /

 $\frac{1}{1}$  The small numbers of live births to mothers under 15 and over 44 years of age were included in calculating the fertility rates.

### Sources:

<u>a</u>/ Natality data are from the following sources:

- (1) North Carolina State Board of Health, Epidemiology Division, <u>Annual Report of Public Health Statistics Section, 1963,</u> Part 2, pages 95, 99, 101 and 105, Raleigh, North Carolina.
- (2) North Carolina State Board of Health, Epidemiology Division, <u>Annual Report of Public Health Statistics Section, 1964</u>, Part 2, pages 97, 101, 103, and 107, Raleigh, North Carolina
- (3) North Carolina State Board of Health, Division of Epidemiology, Public Health Statistics Section, North Carolina Vital Statistics, 1965, Part 2, pages B-4 and B-5, Raleigh, North Carolina.
- (4) North Carolina State Board of Health, Division of Epidemiology, Public Health Statistics Section, North Carolina Vital Statistics, 1966, pages 42, 44, 45, and 47, Raleigh, North Carolina.
- b/ Population estimates used in computing rates were made by linear interpolation from numbers of women by color and age as given in the 1950 and 1960 United States Censuses. Formulas used for linear interpolation were provided by Dr. C. Horace Hamilton and are discussed in the article: Hamilton, C. H. and Perry, J., "A Short Method for Projecting Populations by Age from One Decennial Census to Another," Social Forces, 41 (1962), 164-170.

	Total	Age Group										
Year	15-44	15-19	20-24	25-29	30-34	35-39	40-44					
1963 1964 1965 1966	136.8 136.8 115.3 105.1	147.5 166.1 145.5 141.2	253.3 260.7 202.6 187.2	190.4 165.9 130.4 113.4	106.9 102.9 84.8 73.6	67.6 52.8 49.0 37.8	16.6 15.1 16.0 8.1					

TABLE 7. - Age Specific Birth Rates per 1000 Nonwhite Women 15-44 Years of Age, Mecklenburg County, North Carolina, 1963-1966

#### Source:

Natality data are from special tabulations made available by the Mecklenburg County Health Department and the North Carolina State Board of Health. Rates were computed on the basis of population estimates prepared as described in source reference b of table 6.

TABLE 8. - Birth Order Distribution of Nonwhite Illegitimate Live Births to Mothers 15-44 Years of Age, Mecklenburg County, North Carolina 1963-1966

Year	Total	1	2	3	4	5	6	7	8 or more				
	Per Cent												
1963 1964 1965 1966	100.0 100.0 100.0 100.0	42.6 48.7 50.5 55.0	24.5 23.6 22.1 24.6	11.9 11.9 12.2 10.7	7.4 6.6 6.7 5.2	4.2 3.3 3.3 2.2	3.8 2.0 1.8 1.1	2.0 1.2 1.1 0.6	3.6 2.7 2.3 0.6				
	Number												
1963 1964 1965 1966	554 664 612 <u>1</u> / 635	236 323 309 349	136 157 135 156	66 79 75 68	41 44 41 33	23 22 20 14	21 13 11 7	11 8 7 4	20 18 14 4				

 $\frac{1}{2}$  Excludes one birth of unknown birth order.

#### Source:

Natality data are from special tabulations made available by the Mecklenburg County Health Department and the North Carolina State Board of Health.

	P	erinatal	Mortality		Postneonatal Mortality					
Year	Mecklen- North burg Guilford Carolina County County			Wake County	North Carolina	Mecklen- burg County	Guilford County	Wake County		
	White									
1963 1964 1965 1966	29.9 29.3 29.7 29.8	28.9 26.9 24.6 27.6	34.1 29.9 23.5 28.0	21.4 24.1 27.9 35.7	5.4 5.4 5.2 5.6	2.9 5.3 4.0 4.9	4.7 4.6 7.2 5.0	2.6 3.5 1.6 4.2		
		<u> </u>		Nonw	hite					
1963 1964 1965 1966	52.8 54.7 51.9 50.7	50.0 59.7 42.5 41.8	55.7 68.4 63.2 50.6	50.4 52.0 59.3 50.1	24.0 21.1 21.6 21.0	24.1 16.9 23.4 15.1	14.0 12.9 15.0 19.9	18.7 16.7 22.3 20.8		

TABLE	9.	-	Perinatal	1/	and	Pos	stneonat	al	2/1	Death	Rates	s by	Color,	North	Carolina
			and	Se.	lecte	ed (	Counties	in	the	e Sta	te, 19	963-	1966		

- $\frac{1}{2}$  Perinatal deaths include all deaths in the first 27 days of life plus fetal deaths; the perinatal death rates are per 1000 deliveries (including live births and fetal deaths).
- 2/ Postneonatal deaths include all deaths of infants 28 days to one year of age; the postenonatal death rates are per 1000 live births.

# Sources:

The mortality rates are based on natality and mortality data in the following publications:

- (a) North Carolina State Board of Health, Epidemiology Division, <u>Annual</u> <u>Report of Public Health Statistics Section, 1963</u>, Part 2, pages 95-96, 99-102, and 105-106, Raleigh, North Carolina.
- (b) North Carolina State Board of Health, Epidemiology Division, <u>Annual</u> <u>Report of Public Health Statistics Section</u>, 1964, Part 2, pages 97-98, 101-104 and 107-108, Raleigh, North Carolina.
- (c) North Carolina State Board of Health, Division of Epidemiology, Public Health Statistics Section, <u>North Carolina Vital Statistics, 1965</u>, Part 2, pages B-4 and B-5, Raleigh, North Carolina.
- (d) North Carolina State Board of Health, Division of Epidemiology, Public Health Statistics Section, North Carolina Vital Statistics, 1966, pages 42, 44, 45, and 47, Raleigh, North Carolina.