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USING A MODEL AS A PRACTICAL MANAGEMENT  
TOOL FOR FAMILY PLANNING PROGRAMS

562-71

September 28, 1971

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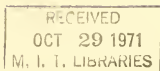
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PLANNING PROGRAMS

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Family Planning Management Research Project



## USING A MODEL AS A PRACTICAL MANAGEMENT TOOL FOR FAMILY PLANNING PROGRAMS

### I. Introduction

Managing a family planning system is a difficult and complex task.

Managers attempt to answer questions such as:

What have been the past sources of success and failure in our programs?

Where is the system going?

What resources will be needed to support system growth? What budget should be sought and how should funds be allotted?

How can a diverse group of clinic service agencies be coordinated?

A great deal of data exists to help answer such questions. Even a single agency or clinic program is confronted by a variety of data sources including client visit records, outreach worker reports, budget figures, target population estimates, opinions and survey findings. These inputs are compounded when there are several programs or agencies involved in the political realities of one area. In fact, the complexity of the information presents a problem to the manager who must make sense out of the data before he can use it to help in his decision making.

This paper describes an application of management science through the use of a model as a tool for program managers and areawide planners to grapple with the inundation of potentially important data. The goals of this model are to improve understanding of how a particular family planning system operates and to support improved program management through the organized use of data in problem diagnosis, forecasting, and examination of strategy alternatives.



This tool has been developed at M.I.T. in cooperation with the agencies providing family planning in Atlanta, Georgia, through their Atlanta Area Family Planning Council (AAFPC).<sup>1</sup> The Council was formed when the major providers of service recognized that continued independent program development was likely to be an inadequate response to the community's need. One of the Council's interests has been focused on understanding the sources of clients needing services, where and how services are in fact obtained, what services are needed and how often are they needed. The model attempts to provide an explicit structure of how the managers of the major service agencies perceive their system.

## II. Perception of the Family Planning Services System

People concerned with family planning programs in Atlanta visualize service facilities spreading through the area, serving a Target Group of clients defined as the reproductive-age, medically indigent population. Atlanta managers saw a common denominator between individual clinic programs emerge in terms of a concern for patient flow: In what ways do potential users flow into and drop out of clinic programs? How do they move between various agencies? How do they flow into and out of the eligible service population? As a means for communicating effectively with each agency potentially involved, the model was designed around a simulation of this area of common concern, the patient flow process.

The Atlanta area had several basic settings or channels for serving the target group: post partum hospital programs, separate or free standing health care centers (e.g., local health department clinics, Planned Parenthood Centers, as well as activities through private medical care and commercially

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1. Work to date has been supported by M.I.T., the Carolina Population Center and since July 1, 1971 by the Health Services and Mental Health Administration, DHEW, under contract HSM 110-71-127.



distributed over-the-counter methods. The formal public channels use a common program measure - the number of individual patients actively receiving family planning services through all publicly supported channels - as a primary evaluation yardstick.<sup>2</sup> Figure 1 diagrams the target population as composed of three major segments: Pregnant, Active in Program, and Neither Active nor Pregnant. Although goals such as improving maternal and child health, introducing the indigent into the health care system and assuring that every child is a planned and wanted child are stated for family planning, the most frequent objective mentioned to reach these goals is increasing the percentage of active family planning patients in the target population.

To understand how patients obtain services, each service agency described how they perceived their own program as working. The model structure was built to reflect the operational program environment in the user's terms; hence, from the beginning, the program directors who use it understand and control a planning process which evolves according to their own needs. Examples of the post partum program and the planned parenthood channels are structured in Figures 2 and 3. The general flow sequence is clearly related to events that are part of the clinic program activities, or to decisions which each patient makes regarding their use of clinic services.

2. O'Connor, R. W., Allen, D. T., and Smith, J.C., "Information Flow and Service Oriented Feedback in Family Planning Programs," Studies In Family Planning, No. 46, October 1969, The Population Council, New York.





Figure 1

TARGET POPULATION		
Pregnant	Not Pregnant and Not Active in Program	Active Family Planning Patients in Program



Figure 2

POST PARTUM PATIENT FLOW  
FROM THE PREGNANT GROUP IN THE TARGET POPULATION

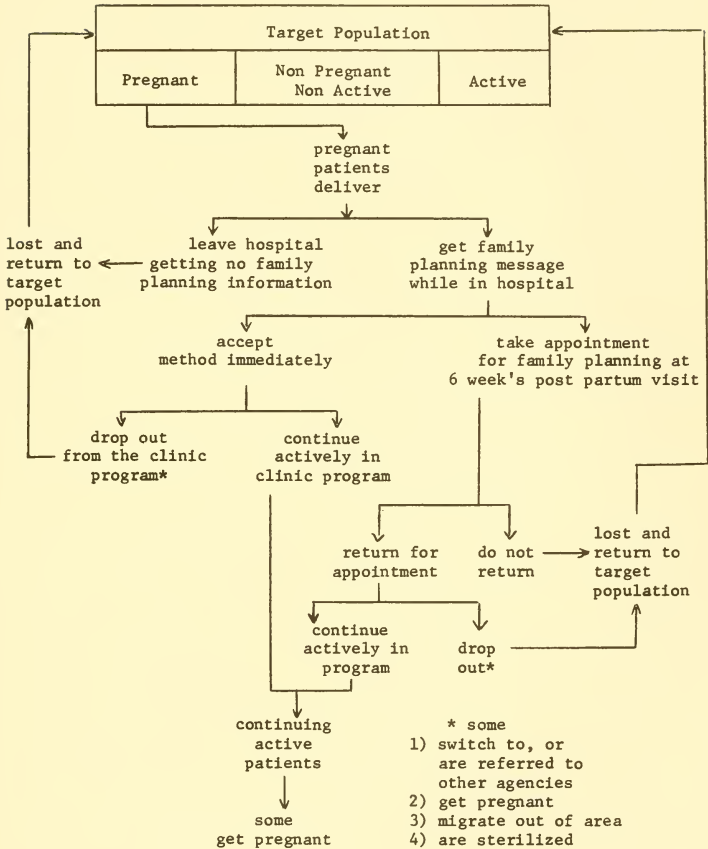
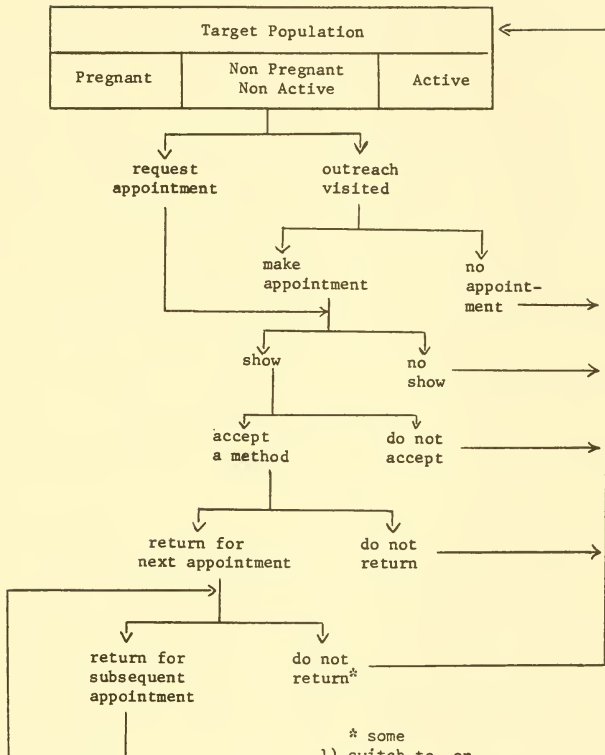




Figure 3

FREE STANDING CLINIC  
PATIENT FLOW FROM THE TARGET POPULATION



\* some

- 1) switch to, or are referred to other agencies
- 2) get pregnant
- 3) migrate out of area
- 4) are sterilized



The post partum patient flow process provides an example of the event oriented approach. Post partum personnel describe patient flow in terms similar to the following: Each month a number of women deliver; of the patients delivering in any month, some receive family planning instruction and perhaps accept a method immediately post partum; of those leaving the hospital with a post partum appointment, some do not return; of those who return, some select different methods, or none at all; of those who leave with an appointment, some return for subsequent appointments. Many facets of the patient flow process are readily described in the program manager's terms as statements of the percentage of people who will move from one point in the flow diagram to the next. For example, 40 percent of those who deliver may accept a contraceptive method immediately, and 80 percent of the immediate acceptors come to the post partum check-up and accept again. A diagram of patient flow has been found to be a good method of defining the explicit structure of a program, as an understandable basis for data analysis and discussion.

### III Model Structure

The flow diagram that managers define as their system description is converted into a mathematical model by defining each event and the percentage that controls the flow from one event to another.<sup>3</sup> Figures 4 and 5 illustrate the model flows as more explicit descriptions of the flows specified in figure 2 and 3. The model structure was based around

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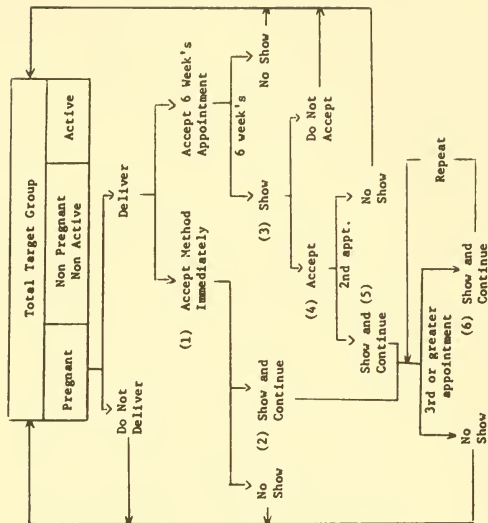
3. Urban, Glen "A Strategic Model for the Management of a Family Planning System", Working Paper, Alfred P. Sloan School of Management, M.I.T., for mathematical details and complete model specifications.





Figure 4

QUESTION SEQUENCE AND FLOW CHART CORRELATION  
FOR A PARTICULAR POST PARTUM FAMILY PLANNING PROGRAM



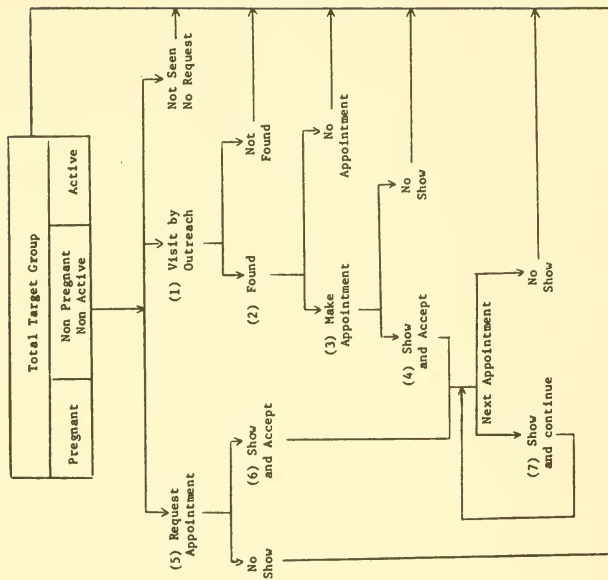
Please enter the following post partum clinic data:

- 1: Fraction of women who will accept some method immediately;
- 2: Fraction of immediate acceptors who return for post partum 6 week's appointment;
- 3: Fraction of women who do not accept immediately, who appear for their 6 week's appointment;
- 4: Fraction of those who appear who accept some method;
- 5: Fraction of those who accept first at 6 week's who appear and continue at the next appointment;
- 6: Fraction of users who have accepted twice who return for the third appointment;



Figure 5

QUESTION SEQUENCE AND FLOW CHART CORRELATION  
FOR A PARTICULAR FREE STANDING FAMILY PLANNING CLINIC FLOW



- 1: Number of recruitment outreach visits per month:
- 2: Fraction of visits that result in contact:
- 3: Fraction of women contacted who are non-users and non-pregnant who make an appointment:
- 4: Fraction of women who make appointment with outreach worker who keep appointment:
- 5: Fraction of women who keep appointment who accept some method:
- 6: Number of women who request an appointment each month:
- 7: Fraction of women requesting who appear for the appointment:
- 8: Fraction of those appearing who will accept a method:
- 9: Fraction of users who return for subsequent appointment:



events rather than directly on the life table techniques widely employed by researchers in evaluating contraceptive effectiveness because few operating managers think in terms of life tables directly.<sup>4</sup> The patient visit is the concrete event at the heart of all clinic programs, and is the service unit which managers must plan for.

Figure 4 includes a series of questions which have been phrased to express the movement from one point to another implied by the flow structure. Figure 5 relates a similar flow example for a free standing clinic such as might be described by health department or planned parenthood program staff. Patient record data and program service statistics answer many of the questions which are asked.<sup>5</sup> Moreover, the user has focused his questions so that distraction by the mass of program information is minimized.

A summary view of the patient flow process is presented in Figure 6, where the target group is viewed as a closed system of the three major segments at any point in time: Pregnant, Active, and Neither Active Nor Pregnant. Active patients either remain active, become pregnant intentionally or through contraceptive failure, or discontinue method use and enter the non-active, non-pregnant group. Pregnant women either remain pregnant, deliver and perhaps obtain family planning, or they return to the non-active, non-pregnant state. Those in the non-active, non-pregnant state either remain so, accept family planning or become pregnant.

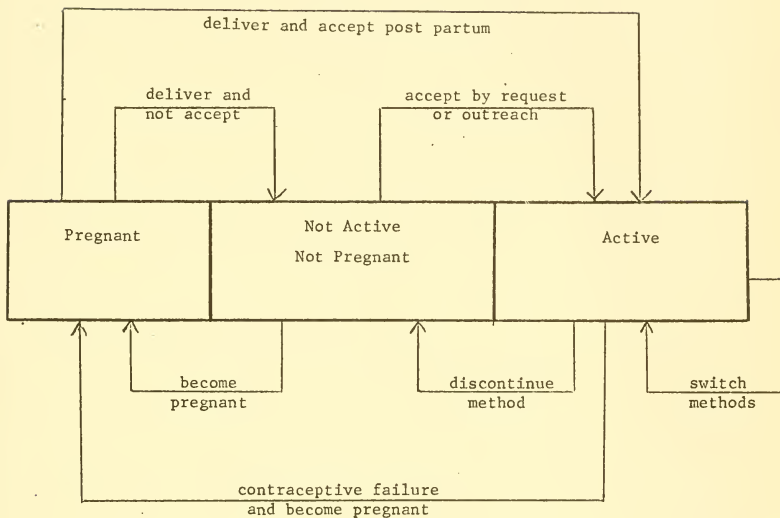
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4. Tietze, C., "Intrauterine Contraception: Research Report " Studies in Family Planning, no. 18, The Population Council, April 1967.

5. Naert, Philippe, Murthy, Srinivasa, "Visit Continuation Rates, Interview times, and their managerial implications for Family Planning Administrators: A Case study of Atlanta," forthcoming.



Figure 6 Target Group Segments and Interaction







These flows represent the basic model structure, and in a specific program situation, managers may want to elaborate their model to include other phenomena. For example, the manager can include segmentation of the target population into groups reflecting different levels of experience, attitudes, or needs. He may want to specify different methods of contraception, use of private protection, inclusion of sterilization and abortion, advertising, migration and referral of patients between service agencies.<sup>6</sup> The model is designed to be used in an evolutionary way, with the manager specifying important factors for his program and expanding the model only insofar as it is perceived as useful.

#### IV. Relating Inputs to Service Outputs

The patient flow process provides the program manager with a means for relating actual resource inputs, as measured by his service statistics in terms of patient visits, selection of methods and the probabilities of continuation, to measures of output such as active patients and couple years of protection. By adding budget data and capacity information, the user can also obtain cost and capacity utilization estimates for planning purposes. Cost effectiveness measures in terms of cost per visit, per active patient, and per couple year of protection are available as model outputs. Program costs at each agency can be entered as a total cost per year figure, or may be broken into fixed cost (i.e., building rentals, fixed salary obligations) and variable cost components (i.e., pills, pap smear kits). Other elements such as system overhead, and communication programs, can be entered as well.

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6. See Urban, above, for a full discussion of evolutionary capabilities.



While facilities to provide service are limited, capacity limitation may mean different things in different programs with the limiting factor varying as the program evolves. Space, nurse or physician manpower might individually be constraints on the program at any particular time. The question of capacity planning can be dealt with by the program manager's assessment of the aggregate visit capacity at his clinics or by a more detailed consideration of scarce resource utilization on first, repeat, or medical visits.

In advanced stages of model evolution, output measures such as unwanted births prevented can be obtained. The range of output possibilities reflects the variety of management objectives, but we would hope the model would help managers cope with higher order goals such as unwanted births prevented per dollar.

#### V. How the Model is Used

Use of this methodology begins by outlining with service agency directors how they perceive their programs operating, and working with them to convert this outline into an initial model of patient flows. Though a computer is used to carry out the calculations, it is recognized that few program directors have the time or interest to get involved with the technical details of computers. To insure that the manager remains in control of the process, an english language, interactive computer system is used.<sup>7</sup>

Past data and judgment are used to estimate the parameters that control movement in the flow process. All interaction in terms of data entry and output reports is mediated through an english language control

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7. For examples of computer input and output, see O'Connor, R. W., "The Use of a Simulation Model as a Decision Support Tool in the Management of Metropolitan Family Planning Programs," Sloan School of Management, M.I.T., May 1971.



system.<sup>8</sup> Using a typewriter console, the manager enters the relevant data into his planning model, which is stored in a timesharing computer.<sup>9</sup> The portable typewriter terminal is connected through an ordinary telephone to the computer and the planner thereby can use it either in his office, in a field training session in a clinic, or at home at his convenience.

The user then runs the model using data for a previous time period, to assess whether the model visualized and the data entered, when projected over time, do indeed track actual events acceptably. The process of tracking and fitting historical data is important in establishing confidence that projections are reasonable for planning purposes. (see figure 7 for model tracking). When the program manager reaches this level of confidence, he can exploit his planning tool for goal setting, exploring policy alternatives and budget planning.

By running his model for a one, two or three year period, the planner can examine expected program growth under existing conditions. For example, program growth measures in terms of percentages of target group being actually served, or numbers of new patients, or couple years of protection, are normal model outputs. Alternative policy considerations, such as increased attention to referral systems, outreach, sterilization, advertising, or abortion services can be examined. The user enters the new data for a specific alternative and the additional calculations are run in a few seconds, giving rapid assessment of each alternative in terms of growth potential. The setting of arbitrary goals for growth is avoided.

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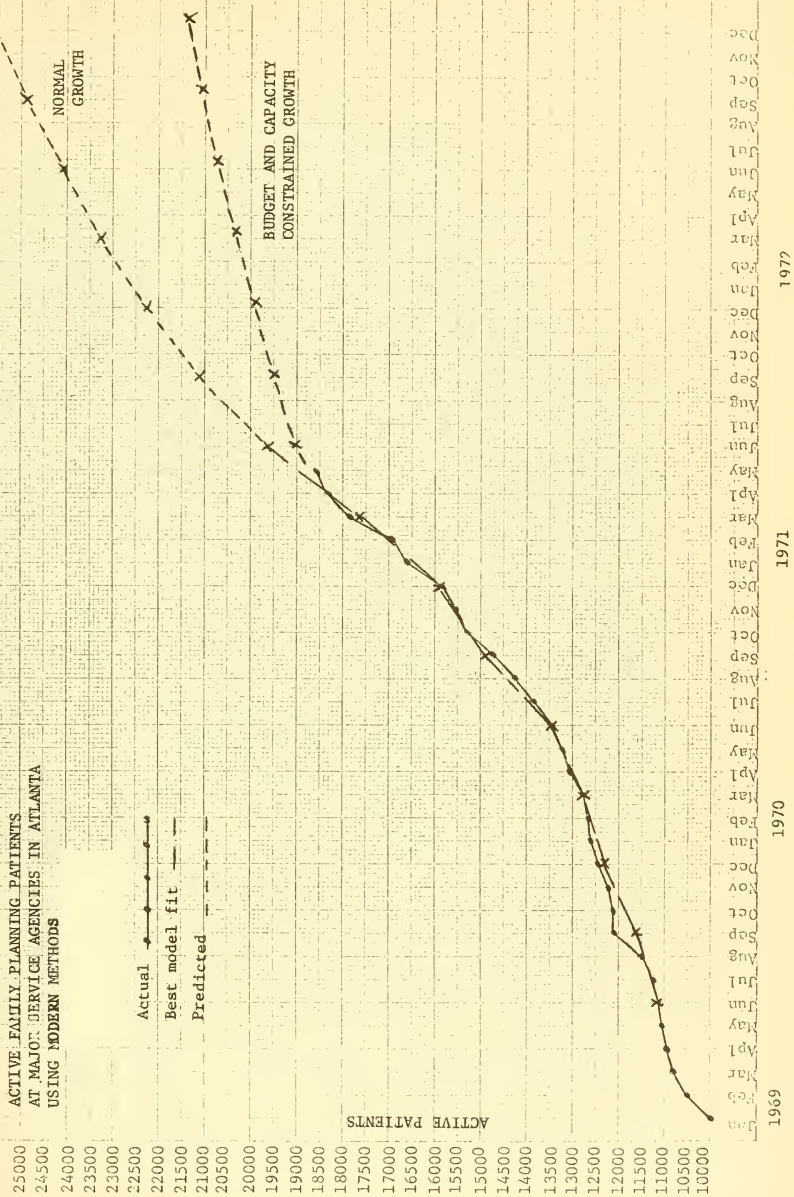
8. Management Decision Systems, Inc, 486 Totten Pond Rd., Waltham, MA 02154

9. At present, IBM 360/67 CP/CMS



Figure 7

ACTIVE FAMILY PLANNING PATIENTS  
AT MAJOR SERVICE AGENCIES IN ATLANTA  
USING MODERN METHODS







Examination of realistic policy and program growth alternatives as part of an understandable process can lead to internalized goals to which program staff can share a commitment.

The budget planning and resource allocation process relates readily to model use. A recent example in Atlanta's experience throws an interesting light on the way funding agency requests for budget documentation can be creatively met. The Atlanta Area Family Planning council was faced with a probable 1972 budget ceiling equal to the 1971 level. Rather than simply submitting budget requests from their member agencies asking for more inputs for clinics, personnel and supplies at either the present or next year's hoped for level, council staff included documentation of the Area's output projections under both constrained and expanded program efforts.<sup>10</sup> Figure 7 shows the projection over a two year period. In the next budget year of 1972, constrained budget levels would produce 4,000 fewer active patients, 16 percent below expected growth, with a loss of 3,000 couple-years of protection, and an increase in cost per couple year of protection. Moreover, to remain with program capacity at the lower budget, and continue to serve the existing patient load, approximately 250 women will have to be refused services as new patients each month.

A soundly data-based output orientation for budget and resource allocation at the program level should be an incentive for funding agencies to evaluate such requests seriously. Rewarding such local initiative should have positive effects beyond the particular program in question. Other local programs may be stimulated to improve their

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10. Atlanta Area Family Planning Council, 1972 Budget submission to H.E.W.



use of data in the planning process when they see such management activity produce effective growth and the funding to sustain it. Funding agencies in turn should be better able to evaluate and monitor local program performance when input/output measures are a required element in every plan submitted. Likewise, summing those data-based plans will facilitate realistic response to legislative demands for progress reports.

### Conclusion

Initial experiences in Atlanta with the development of a user-oriented patient flow model indicates that program managers are interested in using such a tool to organize and exploit the variety of information sources that surround family planning programs. Designed to be used by program directors in their own office via a typewriter terminal, the model is controlled in english and requires no knowledge of or detailed interest in computers. As a practical means for combining program data, experience and judgment, the model encourages examination of alternative program strategies and formulation of realistic, data-based program plans. If this tool in a generalized form proves useful in other settings, then it may represent a meaningful aid to improve management in family planning.





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