
The FPbase Microcomputer System for Managing Community Health Screening and Intervention Data Bases

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Synopsis

Health promotion and intervention projects at State and community levels need computerized data

bases to assist in making policy decisions and in operating the projects. Computer data base systems are used in entering, storing, retrieving, and analyzing information about health project activities and their participants in a timely and cost-effective manner. Computer support is essential for such labor-intensive tasks as post-screening followup of participants, identifying subpopulations, and evaluating recruitment efforts and behavior change programs.

The Pawtucket Heart Health Program developed a microcomputer software package, FPbase, for community health project data base management. FPbase is described and is available for use by other organizations. FPbase incorporates formative and process interactive data base activities and is suitable for use in operating intervention and screening programs at State and local levels. The system accommodates management of data for social marketing, evaluation, followup, and promotional activities.

FPBASE IS A MICROCOMPUTER SOFTWARE SYSTEM for managing data associated with operating community- or State-level health agency projects with intervention and screening programs.

FPbase was developed at the Memorial Hospital of Rhode Island's Division of Health Education. The system is used by the Pawtucket Heart Health Program (PHHP), a major community research and demonstration study investigating community intervention efforts related to cardiovascular disease (1-3).

FPbase responds to the needs of health agencies and projects that provide the residents of a community or State with intervention and screening programs on a limited budget. A computerized data base management system facilitates collecting and storing information about program participants, providing timely and personalized followup mailings to persons identified as at high risk, directing promotional mailings to specific groups, and analyzing program participation rates.

PHHP, funded by the Public Health Service

through the National Heart, Lung, and Blood Institute, is a research project designed to improve the cardiovascular disease risk status of the residents of an entire community relative to a socio-demographically similar comparison community (2, 4-6). PHHP volunteers and staff members offer services related to programs for changing health behaviors. Individuals, small groups, organizations, and the community at large are eligible for the services (7, 8).

The original FPbase was developed by the combined efforts of PHHP staff members in the years 1983-88. FPbase originally was a tool for both formative and process evaluation. The name of the system reflects the initials of these two functions. As it was used and modified, many additional functions were added, including such program aids as mailing label services; followup reminders of physician referrals; and social marketing functions.

The system consists of a specialized community health intervention tracking program integrated with the Paradox (4) relational data base manage-

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ment system. FPbase was tested, evolved, and used on a mainframe computer by PHHP staff at Memorial Hospital of Rhode Island for the early years. Advances in microcomputer technology, cost efficiencies, and the need for registries that persons without technical training in computers could use in tracking participants led to the development of the microcomputer version by the PHHP Evaluation Unit staff in 1988. The current version, FPbase, v. 1.73, came into use with PHHP in 1988. The program is available to other organizations and has been used in the New York State Healthy Heart Programs.

System Capabilities

The system enables staff members of health agencies, projects, and programs to collect and store information about participants, to provide timely and personalized followup mailings to those identified as at risk, to direct promotional mailings to specific groups, and to analyze program participation rates.

Such comprehensive tasks are difficult or unmanageable without the use of a computerized data base management system. As the numbers of program events and rates of participation increase, the need grows for a system that can be used to manage the information systematically, quickly, and economically, using nontechnical persons. Such issues provided impetus for the development of FPbase.

FPbase is a data collection and distribution system as well as a marketing and management tool, allowing accurate data collection and quick analysis for study of project-related issues.

Historical record keeping. The system maintains records of participants and specific subpopulations, such as sex and age groups. Such differentiations allow analysis of trends and determination of the reach and effectiveness of programs.

Followup mailings. Segments of the participating population can be identified to obtain additional data or to followup on previous findings.

Project planning. The system enhances the ability to forecast the activity and success of future events. The availability of already collected data about similar events makes forecasting participation rates of intended populations a practical planning option.

Management reports. Management reports can be generated on a regular basis to reflect participation counts and cross-tabulations by specific demographic criteria.

Program accountability. Regular updates can be provided on program progress, participation rates at selected events, and long-term community participation rates. Management reports can show population participation rates and can cross-tabulate specific demographic criteria. Program staff members, print and broadcast news media, and funding agencies are audiences for the reports. Graphs of quarterly data are used for study of the population by sex and age groups and in determining program coverage.

Process evaluation. The data base provides information for evaluating objectives and progress of health education and health promotion activities.

Health promotion activities. The system enables a program to provide participants with information, announcements, and program updates. The system has the ability to provide mailing labels for selected groups with specific risk factors, such as smoking, obesity, and high blood cholesterol levels. This feature is a cost-effective method of getting information to those who need it most. A program for lowering cholesterol levels of overweight women, for example, could be directed only to those meeting both criteria.

The system can print letters automatically to be sent to those with high-risk levels of blood pressure or cholesterol who do not return for remeasurement within a specified time period. One letter recalls the circumstances of the first contact and provides the blood pressure reading. The recipient is reminded to have a blood pressure check twice a year and is given the times and location of the walk-in clinic. The system provides a followup mailing to the recipient after the reading is obtained. This feature offers cost-effective referral followups to all screening programs.

Data Gathering

PHHP conducts outreach events at public gath-

erings and places and records contacts with participants of intervention programs by using a registration form, called a contact card. The one-page form asks for basic information about the participant, such as name, address, telephone number, date of birth, and sex. Health-related questions asked are

1. Has a parent, brother, or sister had a heart attack or died of heart disease before age 55?
2. Do you have diabetes?
3. Do you smoke?
4. Have you ever been told you have high blood pressure?
5. Do you presently take blood pressure medication?
6. Have you ever been told you have elevated blood cholesterol?
7. Do you presently take cholesterol-lowering medication?
8. Do you presently exercise vigorously for 20 minutes or more at least three times a week?
9. How did you first hear about this event?

The data obtained, plus physiologic risk factor assessments, such as blood pressure and cholesterol levels, are supplemented with a precoded activity identification number that identifies the type of event at which the encounter took place, the date, and the location of the event. The data for each person are identified by a unique alphanumeric personal identification (PID) number assigned by FPbase at the time of data entry. The PID and the activity identification number permit tracking participants by activity, generalizing data among activities, and selecting participants by activity for followup by mail or telephone.

Participants in health screenings or programs are asked to complete the contact card as part of a registration process. Early problems were the reluctance of staff members to require necessary information from participants and participants resisting completing the card. The problems lessened as staff members gained more understanding of the importance and necessity of having respondents fill out the contact card. After a participant fills out the contact card, it is collected by volunteers or staff members and used to record risk factor assessments. The contact card provides background information necessary to counseling and referral services. Being able to identify behavior patterns related to cardiovascular risk factors permits program personnel to focus recommendations and referral advice. After the event, the information is entered in the system.

Data Organization

FPbase has two major levels of data, the individual level, focusing on the history of the specific person, and the activity level, focusing on an activity and cross-sectioning data around that activity. Individual-level data includes name, address, and telephone number; socio-demographic characteristics; cardiovascular disease risk factor values; and program participation history. Activity-level data includes location, date, and program, with the risk factor and type of program. Each report generated by FPbase is based on one of the two views of data.

The output can be mailing labels for referral reminders or directed mailings, reports, data files for statistical analyses, and sampling frames for followup.

Data Analysis

Case study. The following case study illustrates the system's operation in a cholesterol screening, counseling, and referral event (SCORE) that was held at a local jewelry manufacturing facility on March 15, 1988. The 110 employees who attended the event had at entry into the program a mean blood cholesterol level of 204.3 milligrams per deciliter (mg per dl).

A followup cholesterol SCORE was held there 2 months later. Of the 110 employees, 77 returned, along with 7 employees who had not attended in March. The 77 employees had a mean cholesterol level of 201.56 mg per dl. The 7 new attendees had a mean blood cholesterol level of 206.57 mg per dl.

The system was able to track each person's baseline and followup cholesterol value and calculate the difference between the two measurements. The difference ranged from 45 mg per dl to minus 95 mg per dl during the 2-month period. This information, in conjunction with demographic and self-reported risk factor data contained in the FPbase data registry, permitted individual counseling of participants and aided the company in mapping out strategies for future health education programs.

Individual-level function. Choosing the individual-level of data allows the program to follow the intervention contacts with each participant. This technique is an effective generalization tool useful in determining if participants tend to enter a program only once or are repeat users of the intervention activities.

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The technique allows program planners to note if repeat participants generalize from one risk factor to another. An example of generalization is shown by program statistics for 1985, picked as a typical year. In 1985, 8,251 persons joined their first PHHP activity. Of them, 5,280 (64 percent) joined a second activity between 1985 and 1991, while 2,971 (36 percent) did not. Of those joining a second activity, 3,624 (44 percent) joined a screening, counseling, and referral event; 911 (11 percent) joined a group event; 606 (7 percent) served as a volunteer; and 139 (2 percent) joined a self-help activity.

Grouped by risk factors, this level of analysis allows review of the number of persons who engaged in multiple program offerings by order of participation. The historical record of participant involvement is helpful in evaluating the dynamics of the reach of programs within the community. A particularly important subpopulation that is identified by this level of analysis is what PHHP refers to as new joiners, those participating in their first PHHP program activity, rather than those who participated in programs in the past. New joiners are identified by having the system search the data base for previous entries for each new PID. If no match is made, the entry is labeled as a first encounter. Each type of activity can be examined in terms of socio-demographic characteristics and expanding program reach.

Activity-level function. The activity-level function permits a review of participation rates across risk factors and program intervention sites. By choosing this analysis perspective, FPbase can compile project information related to numbers, types of program activities delivered, and sites. Activity-level function allows differentiation between types of participants recruited for different activities at different sites. It can be used to select participants from a specific type of program or site for follow-up evaluation of self-reported behavior change by mail or telephone.

Data Base Operation

Configuration. The software programs that make up FPbase are the MS-DOS (B) operating system, the Paradox data base management system, FPbase application programs, and FPbase data bases. Paradox is the basis of FPbase. It stores data in the form of tables that are arranged in fields (columns) and records (lines). Reports may reflect data from different tables if the tables are related by a common data element, such as the PID.

The system uses a many-to-many multi-relational data base scheme. The participants' personal information, such as name and address, is in a master name file. The participants' measurements are in a transaction file, thereby simplifying confidentiality controls and using less computer storage by having names in only one place. Each time a participant is seen, a new transaction record is created for that person. Other files contain codes and information on each activity. The linked data base can be queried to provide a variety of reports.

Networking. The system functions equally well on stand-alone computers or on networks such as Novell. When running on a network, data entry and reporting can take place simultaneously, using a temporary transaction file created at data entry. Transactions are posted to the system at the end of the day. In a multi-user setup, more than one person can enter and edit data at the same time. With a suitable hardware configuration, authorized users can access the system remotely to perform data entry and access the data base to retrieve participant information for use in counseling and referral.

Report generation. FPbase generates reports quickly on project activities, groups, and individual participants. The reports provide the program manager, program staff, and researchers with needed data for evaluations and strategic planning. The system creates standard reports, such as on blood pressure and cholesterol levels, by sex, age group, participants requiring followup, and other criteria. If a modem or a laptop computer is being used, the system can generate an analysis report at the intervention site that gives frequencies and cross-tabulations of a participant's measurements and risk factors.

Each output option can be based on any one or a combination of various types of data in the data base. Options include several valuable educational features, such as generating a referral reminder letter for a person found to be at high risk with a

high level of blood cholesterol or blood pressure. Such a participant is referred to a physician immediately and is requested to return for a followup measurement at a future SCORE. If the participant does not return within a specified period of time, the system automatically generates a reminder letter of the physician referral that is individualized for that respondent.

Automatic reminders ensure that the important followup responsibility of screeners will be met without extensive effort. The ability to maintain records of measured values of specific persons can be valuable in counseling. A person's history can be recalled from the data base and displayed when the counselor has access to the equipment.

Standard reports generated by FPbase can be requested and printed by the person in charge of data entry, or by other program personnel. The system is menu-driven and does not require extensive training to use the report option. The ability to create mailing labels and to produce participant form letters is accessible through menus. For optional detailed analyses, FPbase data can be exported to other software applications, such as SAS (C), SPSS (D), and BMDP (E). These software applications can provide statistical analyses of the registry data.

This procedure requires a staff person with the technical knowledge of data transfer and experience with statistical software. The procedure allows quick compilation of site comparisons during any period, of changes in cardiovascular disease risk factor values, and of differences in socio-demographic or other variables among those attracted by specific programs at various sites, such as schools, work sites, and organizations.

For example, blood cholesterol level measurement values of those who returned for a second cholesterol measurement and those who did not may be compared, together with differences in measured values in any period. The files contain information gathered on each person and may be combined with other data sets, such as telephone interviews, household surveys, morbid and mortal events, and other types of data from other sources. They may be combined with FPbase output so long as the same rules are used for forming the PID.

Using Paradox's query by example (QBE) capabilities, lists and counts of participants can be generated based on any criteria, a technique that is useful for identifying specific groups of participants. For example, one can select all women ages 40 through 59 years who smoke, have high blood cholesterol levels, and are overweight. QBE can

provide reports that show how participants have generalized from one risk factor to another or from one activity to another within risk factors.

System Requirements

FPbase operates on IBM AT- or 386-compatible microcomputers with 1 megabyte of random access memory (RAM). System performance is improved with additional RAM. Up to 2 megabytes (MB) of RAM can be accessed by the FPbase system. The amount of hard disk storage space needed depends on the needs of the project and the number of expected program participants (each participant record takes up about 1 kilobyte of storage space). The operating system uses about 1 to 2 MB of hard disk space, depending on project needs for the report or management options.

Personnel Requirements

FPbase is designed to be incorporated into a project's daily operations. Operating the system may be made part of a clerical worker's job responsibilities. Depending on the applications of the system and the number of people using it, the level of staff expertise needed can be minimal.

The volume of activities and the numbers of program participants determines the number and type of staff needed to run FPbase. The data entry and report functions can be handled by secretarial or clerical staff members. This activity involves typing the contact card information into the system and editing or updating existing information. Quality control mechanisms are built into the software to prevent duplication of PIDs that can arise through use of other names, incorrect birth dates, or other sources of error. Another quality control feature is the ability to query the system for matching PID components following a name change, as from marriage or divorce. The time spent updating the data base is directly related to the number of program contacts. On an office networked system, data entry can take place at separate work stations simultaneously.

Summary

FPbase is a powerful, comprehensive, and efficient mechanism for storing and retrieving information on participants in community health screening and intervention programs, maintaining accurate information about community interventions, providing staff members with detailed reports on

program performance, and identifying population subgroups for health promotion direct mailings or community telemarketing efforts.

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Equipment

- A. Paradox, v. 3.0 or later. Borland International, Scotts Valley, CA, 1988.
- B. MS-DOS, v. 3.0 or later. Microsoft Corporation, Redmond, WA.
- C. SAS, v. 6.01 or later. SAS Institute, Inc., Cary, NC.
- D. SPSS, v. 3.0 or later. SPSS, Inc., Chicago, IL.
- E. BMDP, v. 88.2. BMDP Statistical Software, Inc., Los Angeles, CA.

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