Translating Research into MCH Service: Comparison of a Pilot Project and a Large-Scale Resource Mothers Program

Mary M. Rogers, DrPH
Mary D. Peoples-Sheps, DrPH
James R. Sorenson, PhD

Dr. Rogers is Surveillance and Evaluation Coordinator in the Bureau of Maternal and Child Health, South Carolina Department of Health and Environmental Control. Dr. Peoples-Sheps is Associate Professor of Public Health Nursing and Maternal and Child Health and Dr. Sorenson is Chair and Professor of Health Behavior and Health Education, both in the School of Public Health at the University of North Carolina at Chapel Hill.

Tearsheet request to Mary M. Rogers, DrPH, South Carolina Department of Health and Environmental Control, Bureau of Maternal and Child Health, Roberts Mills Complex, Box 101106, Columbia, SC 29211; tel. 803-737-3940; FAX 803-734-4442.

SYNOPSIS

THIS STUDY EXAMINES the process and effect of translating a pilot research project into a large-scale service program. In a pilot resource mothers program for pregnant teenagers, participants had fewer low birth weight infants than teenagers in the comparison group. In the corresponding large-scale service program, a similarly positive effect on low birth weight was not seen. In an effort to understand how these differences occurred, the evaluation methodologies and key characteristics that describe the background, infrastructure, components, and service providers of the two projects were compared.

Important differences between the pilot project and the service program were seen in funding stability, diversity of staff, community versus health department ownership of the program, caseloads, and levels of training and supervision. It seems probable that these differences brought about changes in the intensity and character of the intervention from the pilot to the service program, leading to a reduction of the intervention's efficacy in reducing the number of low birth weight infants. The implications of these findings for researchers and program planners are discussed.

In an effort to improve pregnancy outcomes, programs providing social support services are increasing throughout the United States (*1–4*). They include a complex set of interventions designed to reduce multifactorial problems such as low birth weight (LBW). A number of such projects, mostly pilot research projects, have been evaluated (*5–11*). Some research projects that were found to be effective have been translated into large-scale service programs (*4*). Unfortunately, most of the large-scale programs have not been adequately evaluated. Experts question to what extent program effects are diluted when an effective research project is used as the basis for a large-scale program in a real world setting (*12*). Of specific concern is whether the intervention in a large-scale program can be or is actually delivered in ways that maintain the effectiveness of the research project (*13,14*). In this paper, we examine the process and effect of translating a pilot research project into a large-scale service program.

The recently completed evaluation of a resource mothers program for pregnant teenagers in 16 counties in South Carolina (*15*) provided an opportunity to compare the program's effects with those of its three-county pilot project (*7*). The results of the two evaluation studies, summarized in the first box, showed

similarities but also some surprising differences. In the pilot project, a smaller proportion of teenagers received inadequate prenatal care—defined as fewer than five prenatal care visits or care begun after the sixth month of pregnancy—than teenagers in the comparison group. The pilot's teenagers also had a significantly lower proportion of LBW and small-for-gestational age (SGA) infants than teenagers in the comparison group. The results of the large-scale service program suggested a similarly beneficial effect on adequacy of prenatal care as seen in the pilot. In addition, for unmarried teenagers, the preterm birth rate was also reduced. But unlike the pilot project, the service program had no effect on LBW or SGA.

In an effort to understand how these differences occurred, the evaluation methodologies used in the two studies were compared and summarized in the first box. In addition, key characteristics that describe the background, infrastructure, components, and service providers of the project and the program were compared. Data for this comparison of characteristics were obtained from several sources: project and program reports and records, publications, focus groups with health department and program administrative and supervisory staff, and interviews with key pilot project and program personnel. Unfortunately, the number of visits each participant received and the details of activities during each visit, such as referrals made or transportation provided, were not available. In both the pilot and the program, resource mothers documented their activities during each home visit, but their documentation was not compiled in a consistent summary format that could be used in this analysis.

The Pilot Project and the Service Program

Evaluation methodologies. In the pilot, outcomes of 565 matched pairs of primigravida teenagers, ages 18 and younger, were compared. Comparison teenagers were matched with the program participants on year of delivery, age of mother, and race and sex of child and were drawn from four counties where the pilot was not available. In the large-scale service program, outcomes from primiparous teenagers ages 18 and younger were compared across two groups: a program group (N=1,901) and a comparison group (N=4,613) drawn from 16 counties where the program was not offered. Rather than matching on specific variables, multiple logistic regression was used to estimate the effect of participation in the program with simultaneous adjustment for age, race, marital status, and previous pregnancies.

Both the pilot project and the service program targeted teenagers ages 17 or younger who had not previously delivered a child. It is not surprising then that the participants in the two evaluation studies were similar. As seen in the first box, the majority of the study participants were black unmarried teenagers. It is of note that both studies included teenagers ages 18 and younger to capture those teenagers who were age 17 at enrollment but turned 18 by the time of delivery. Further, in both studies, only teenagers having a first delivery were included.

Key characteristics of the project and program are summarized in the second box and are detailed in this section.

Background. The underlying hypothesis of both the project and program was that the provision of social support services was expected to improve pregnancy outcomes by buffering the effects of stress and encouraging positive behaviors such as use of prenatal care and healthy pregnancy habits. The intervention in both included outreach, education, coordination of services, followup, and advocacy. Resource mothers were paraprofessional women selected from the community who visited participants in their homes monthly during pregnancy. These visits were structured with specific educational goals and learning objectives. Prenatally, emphasis was on the need for early and regular prenatal care and on reduction of risk factors such as smoking, drug use, and poor nutrition. Resource mothers facilitated the teenagers' use of prenatal care and support services by following up on appointments, arranging transportation, and assisting with referrals to health and community services. The resource mother acted as an advocate for the participant by bringing her needs to the attention of staff within health and community agencies. Because priority was given to the teenagers' particular needs, the resource mothers had flexibility in attending to those needs and adding visits if necessary. In the pilot project, five resource mothers served the three counties; for the service program, 16 served the 16 counties.

The pilot project was a component of the four-year (1980–84) Rural Infant Care Project conducted by the Medical University of South Carolina. The project targeted three South Carolina counties that had high ecological risks such as poverty and low educational status and large numbers of adolescent pregnancies and LBW infants. Funding from a Robert Wood Johnson Foundation grant was stable over the life of the pilot. Approximately $585 was spent per teenager in the pilot. (Because of the complex organizational structure of both the pilot and the program, it was difficult to obtain precise cost estimates retrospectively.)

The large-scale service program was initiated in 1985 by the South Carolina Department of Health and Environmental Control (DHEC) and implemented in a stepwise fashion over three years in 16 South Carolina counties. These counties were selected because of their high pregnancy, abortion, and birth rates and poor perinatal outcomes among teenagers. Three of the 16 counties also had been in the pilot.

The service program received a combination of State and Federal funds. Initial funding came from a three-year Special Project of Regional and National Significance (SPRANS) grant from the Bureau of Maternal and Child Health, Public Health Service. These funds were intended to demonstrate the incorporation of the resource mothers intervention into the existing structure of the State health

Box 1. Comparison of the Effects and Methods Reported in the Evaluations of the Resource Mothers Pilot Project and the Resource Mothers Service Program

Indicators	*Pilot project (7)*	*Service program (15)*
	Effects	
Adequacy of prenatal care	Positive. 18.3 percent of participants versus 35.9 percent of comparison group had inadequate care (< 5 visits or begun after 6th month) ($P < 0.001$) RR=0.51[2]	Positive. Less than adequate care, according to Kessner Index (27)[1]; OR=0.64 with 95 percent CI = 0.56, 0.72.
Low birth weight (< 2,500 grams)	Positive. 10.6 percent of participants versus 16.3 percent of comparison group ($P = 0.006$); RR=0.65[2]	No effect. OR = 0.97 CI = 0.81, 1.15
Preterm births (< 37 weeks)	Not reported	Positive among unmarried teenagers. OR = 0.81; CI = 0.70, 0.95
Small for gestational age (< 2,500 grams and ≥ 37 weeks)	Positive. 4.9 percent of participants versus 9.8 percent of comparison group ($P = 0.002$) RR = 0.5[2]	No effect. OR = 1.11 CI = 0.85, 1.44
	Methods	
Study participants	575 primigravida teenagers, 18 and younger, 89 percent black, 93 percent unmarried	1,901 primiparous teenagers, 18 and younger, 77 percent black, 83 percent unmarried
Comparison group	565 primigravida teenagers matched on year of delivery, age of mother, and race and sex of child and drawn from four counties where the program was not offered. Matches were found for 98.3 percent of participants.	4,613 primiparous teenagers 18 and younger, from 16 counties where the program was not offered. Statistical adjustments were made for age, marital status, race, and previous pregnancies.

[1]The Kessner index measures the quantitative adequacy of prenatal care. It takes 3 factors into account simultaneously: time of first prenatal visit, number of prenatal visits, and gestational age at time of birth.

[2]Relative risk calculated from data in article to give an approximation for the odds ratios.

NOTE: RR = relative risk, OR = odds ratios, CI = confidence intervals.

department. The grant funds were to be used for startup cycles for six counties per year, for a total of 18 participating counties at the end of the three-year grant period. After the first startup year in the counties, DHEC was to assume funding for the program through State appropriations. However, these plans had to be modified. The State was able to appropriate funds to continue the program in the first six counties but not in the second six. This limitation resulted in financial constraints for the program and affected DHEC's ability to expand into the last six counties in the third year. Instead, the program was implemented in four adjoining counties. No additional staff members were added to provide services in those counties, limiting the program's penetration into the new counties. When the grant ended in 1988, the program was operating with a combination of State and Maternal and Child Health block grant funds. In 1989, it was estimated that $600 was spent per teenager in the service program.

Infrastructure. The pilot project was implemented through several institutions (that is, a medical school, a local hospital, the State health department, and the Area Health Education Center). Because the pilot operated as a special research project, it was not fully absorbed into the institutional bureaucracies. Efforts were made to develop community ownership of the pilot. For example, each community found and funded a local office for its resource mother. Staff from diverse backgrounds were stable during the life of the pilot; a developmental psychologist acted as the project coordinator, and a pediatric nurse practitioner and a social worker provided administrative and supervisory support.

The service program was administered within DHEC's Bureau of Maternal and Child Health (MCH), Division of Maternal Health. Program staff consisted of a State coordinator and four district coordinators, all social workers. The State coordinator, from the central office of DHEC in Columbia, SC, was responsible for overall administration and coordination of the program. Her administrative functions varied over the life of the program. During the grant years, she had full-time responsibility for administrating the program and providing consultation to staff. When the grant ended, her position became part-time, and she assumed a consultant role with no line authority to the districts.

District coordinators were members of the social work section of the district health departments. They implemented and coordinated the program's activities and supervised the resource mothers within a multi-county district. Although in theory the district coordinators were supposed to supervise resource mothers on a full-time basis, they were often given additional responsibilities that were not directly related to the program, such as providing services in health department clinics.

Box 2. Comparison of Selected Characteristics of the Resource Mothers Pilot Project and the Resource Mothers Service Program

Characteristics	*Pilot project (7)*	*Service program (15)*
	Background	
Years in operation	1980–84	1985–present
Geographic location	3 SC counties	16 SC counties
Funding source	Robert Wood Johnson Foundation grant	Combination of SPRANS grant, 1985–88, State funds, and Federal MCH Block Grant
Cost	$585 per teenager	$600 per teenager, 1989
Stability of funding	Consistent, grant	Variable over life of program
	Infrastructure	
Contextual setting	Special demonstration project, community ownership encouraged	Service of State health department
Organization	Institutions involved: medical school, local hospital, State health department, and Area Health Education Center	Department of Health and Environmental Control (DHEC), Division of Maternal Health, district and local health departments (in social work section)
Administrative and supervisory staff	Project coordinator was a clinical psychologist; supervisers were a pediatric nurse practitioner and a social worker	1 State coordinator 4 district coordinators (all social workers)
Administrative and supervisory stability	Consistent over life of program	Variable: central control by State coordinator during SPRANS grant, then local control with State coordinator acting as consultant to districts. District coordinators were to supervise full time but often had other responsibilities.
	Components	
Objectives of project	Increase use of prenatal care and support services, reduce adverse health habits, and improve pregnancy outcomes	Increase use of prenatal care and support services, reduce adverse health habits, and improve pregnancy outcomes
Service delivery mode	Home visiting	Home visiting

Components. Because the service program was designed according to the pilot project, the objectives relating to pregnancy were the same for both: to increase the use of prenatal care and support services, to reduce adverse health habits, and to improve pregnancy outcomes, such as LBW and infant mortality. In addition, both were also designed to affect outcomes such as child health, completion of high school, and delaying of a second pregnancy. In both, services were delivered through home visits. As previously mentioned, the target population for both the pilot project and the service program was teenagers ages 17 and younger who had not previously delivered a child. In August 1988, the service program gave the counties the option of including teenagers ages 19 and younger regardless of parity.

In both the pilot and the program, staff recruited teenagers to become participants through community education and outreach activities (for example, through presentations about the programs and distribution of brochures). Referrals came from a variety of sources, such as the Special Supplemental Food Program for Women, Infants, and Children (WIC), prenatal clinics, human services agencies, schools, churches, private physicians, and teenagers already in the program. The pilot project's policy was to see all those referred to the project. In the service program, district coordinators prioritized referrals by need because of the size of resource mothers' caseloads—50 to 65 teenagers. Although prioritizing was done differently in each county, need was often determined by the age and parity of the teenagers, with first priority going to teenagers who were younger or having their first baby rather than to teenagers who were older or having their second or third infant.

Characteristics	*Pilot project (7)*	*Service program (15)*
	Components continued	
Target population	Ages 17 and younger having first baby	Ages 17 and younger having first baby. (In August 1988, expanded to ages 19 and younger regardless of parity)
Recruitment efforts	Community education and outreach by staff	Community education and outreach by staff
Source of referrals to program	Health department, prenatal care clinics, private physicians, social service agencies, schools, program participants	WIC, prenatal care clinics, social service agencies, schools, churches, private physicians, program participants
Processing of referrals	Policy to see all those referred to the project	Referrals prioritized by need (based on age and parity) by district coordinator
Number served	750+ enrolled	2,400+ enrolled, 1985–89
	Service providers	
Characteristics	Resource mothers paraprofessional, employed, full-time	Resource mothers paraprofessional, employed, full time
Cost	$14,000 per resource mother for 1 year	$15,200 per resource mother for 1 year
Number	5 in 3 counties (1.7 per county)	16 in 16 counties (1 per county)
Caseload	30–35	50–65
Training	6 weeks initial, updates 1 day a week for 1 year, then half day	3 weeks initial, periodic updates
Supervision by	1 pediatric nurse practitioner and 1 social worker for 5 resource mothers	4 district coordinators for 16 resource mothers
Level of supervision	Weekly observations of home visits, monthly or more frequent individual review of all cases, and group meetings to review problem cases	Periodic review of caseloads and problem cases and occasional observations of home visits
Location of office	Community sites, such as hospital day care center, scout hut, and hospital outreach center	Local health departments

Service provider. In both the pilot and the program, resource mothers were recruited from the local community and employed full time to provide services. They were chosen for their personal warmth, successful parenting experience, knowledge of community resources, demonstrated ability to accept responsibility, effective interpersonal skills, and evidence of natural leadership. Most of the resource mothers were older women who were mothers themselves; many had been teenage mothers. The approximate cost per year (that is, salary, fringe benefits, and travel) for one resource mother in the pilot was $14,000; in the service program it was $15,200.

Training of the resource mothers and expectations once in the field varied between the pilot project and the service program. Resource mothers in the pilot project had six weeks of initial training with updates one day a week for the first year and a half-day in subsequent years. Once in the field, five resource mothers covered three counties with a caseload of 30–35 teenagers each. They were directly supervised by a pediatric nurse practitioner and a social worker, and they were observed weekly during home visits and had monthly or more frequent review of their cases. In addition, the resource mothers had group meetings to discuss problem situations. Their offices were in the community (for example, at a hospital day care center, a scout hut, and a hospital outreach center).

The resource mothers in the service program received three weeks of initial training with periodic updates. Sixteen resource mothers covered the 16 counties, often with a caseload of 50–65 teenagers. They were supervised by the district coordinators, all social workers, through periodic conferences to review caseloads and problem cases and through

occasional direct observation of home visits. One district coordinator was responsible for four resource mothers over a three- or four-county area. Program resource mothers had offices in the local health departments and were considered MCH health team members since they supplemented and reinforced the prenatal and infant clinical services provided by health departments and private care providers.

Discussion

In considering the differences in effects on LBW and SGA of the two interventions, one must consider the validity of the study results. Both studies had adequate numbers of subjects for statistical analyses, and there were controls for potential contributing factors such as age, parity, and race of the mother. The study participant populations were similar in regard to age, race, marital status, and parity. It is possible that the participants could have differed on other contributing factors (such as smoking behaviors, drug use, and dietary habits) that were not measured in either study. Since the pilot and the service project targeted similar populations, however, it seems unlikely that the study participant groups would vary enough to account for the differences in effects.

The pronounced differences between the pilot and the service program strongly suggest that the differences in perinatal outcomes are attributable to the changes in the intervention from a special research project to a service program within the health department. Important differences were seen in funding stability, diversity of staff, community versus health department ownership, and in the caseloads and levels of training and supervision given the resource mothers. It seems probable that these differences led to changes in the intensity and character of the intervention from the pilot to the program, with a reduction of the intervention's efficacy in improving the numbers of LBW and SGA infants.

The budgetary constraints of the service program resulted in higher caseloads of the resource mothers and coverage of a wider geographic area than in the pilot (perhaps accounting for some of the higher cost per resource mother in the program than in the pilot because of their travel expenses). Teenagers in the service program probably received fewer visits or shorter client contacts than teenagers in the pilot. Further, although the resource mothers in both had the flexibility to add visits if needed, this was more likely to occur in the pilot where the resource mothers had more time available because of smaller caseloads and less distance to travel. Also, the program resource mothers probably had less time for establishing linkages with community and health-related services, possibly resulting in fewer referrals to needed services than in the pilot, in which there was a strong emphasis on community involvement and more time to develop ties.

Although the pilot project and the service program were conceptually similar in their objectives and activities, differences in implementation resulted in changes in the character of the intervention as the pilot was expanded on a large scale. Because the program resource mothers had a shorter initial training period and more sporadic updates than in the pilot, some critical elements of the intervention may have been lost or emphasized differently. Also, activities of the program resource mothers were not supervised as closely or by a multidisciplinary team as in the pilot project, allowing for variations in the provision of services (*16*).

Both programs were built on sound theoretical postulates regarding the modifying effects of social support on the relationship between stress and pregnancy outcome (*17–21*). Perhaps because of this, the service program was partially successful despite less than optimal circumstances. The development of warm, trusting relationships between the resource mothers and participants in both may have been critical in modifying the effects of stress and positively affecting preterm birth among the service program participants (*22*).

But the inconsistent results in LBW and SGA may be related to variations in the intensity and content of the pilot and the service program as they were delivered. Behaviors affecting fetal weight gain, such as smoking, drug use, and dietary habits, are difficult to change, often requiring intensive interventions (*23–25*). The pilot project may have had the intensity and content to modify these behaviors, while the service program had lost some effective components.

This paper documents a clear and substantial shift in the intensity and character of the resource mothers intervention when it was expanded from a pilot project to a large-scale service program. This finding has implications for researchers designing pilot projects as well as for planners developing service programs on the basis of the research evaluations. Often, in a pilot project, researchers test a novel and complex intervention. However, if the intent is eventually to expand it, researchers would ease the translation into a real-world setting by selecting components for their research project that are familiar to and compatible with the practice world.

With the resource mothers intervention, the health department MCH team was certainly familiar with home visiting but was not able to adopt the intervention at the same level of intensity as in the pilot. If researchers would layer the intensity of the intervention into at least two levels and use a selected number of delivery techniques (for example, home visits alone or combined with telephone or mail contacts), they could then determine which levels of the intervention and methods of delivery are effective. With this detailed information, program planners could disaggregate components of the intervention that best fit into their service capabilities (*13,14*).

Program planners must consider carefully if a research project is do-able in their particular setting. In designing service programs, planners need to decide if they are going to be faithful to the research intervention. If they decide to implement the research intervention as tested in the pilot, efforts should be made to maintain the integrity of the

intervention. One priority would be to assure adequate and stable funding (*26*). Also, ongoing monitoring and supervision are essential to maintaining consistency in the delivery of the intervention on a large scale.

If deliberate changes are made, planners should be aware of their significance to the program's efficacy. For example, a deliberate decision was made to place the service program into the social work structure of the health department rather than into a multidisciplinary community setting as in the pilot, changing the configuration of the elements of the intervention. When there are changes in the intervention, the same level of efficacy found in the pilot cannot be expected in the large-scale service program.

The work summarized in this paper was partially supported by a National Research Service Award Institutional Pre-Doctoral Fellowship from the Agency for Health Care Policy and Research, Department of Health and Human Services, through the Cecil G. Sheps Center for Health Services Research, Training Grant No. T32-HS00032 and by Project No. MCJ-107 (The Analytic Skills Enhancement component of the Maternal and Child Health Training Grant) from the Maternal and Child Health Bureau (Title V, Social Security Act), Health Resources and Services Administration, Public Health Service.

References

1. Chapman, J., Siegel, E. and Cross, A.: Home visitors and child health: analysis of selected programs. Pediatrics 85: 1059–1068 (1990).
2. Elbourne, D., Oakley, A., and Chalmers, I.: Social and psychological support during pregnancy. *In* Effective care in pregnancy and childbirth. Vol. 1, edited by I. Chalmers, M. Enkin, and M. J. N. C. Keirse. Oxford University Press, Oxford, UK, 1989, pp. 221–236.
3. Home visiting: opening doors for America's pregnant women and children. National Commission to Prevent Infant Mortality, Washington, DC, 1989.
4. Home visiting: a promising early intervention strategy for at-risk families. (GAO/HRD-90-83). U. S. General Accounting Office, Washington, DC, 1990.
5. Bryce, R. L., Stanley, F. J., and Garner, J. B.: Randomized controlled trial of antenatal social support to prevent preterm birth. Br J Obstet Gynaecol 98: 1001–1008 (1991).
6. Dawson, P., Van Doorninck, W. J., and Robinson J. L.: Effects of home-based, informal social support on child health. Dev Behav Pediatr 10: 63–67 (1989).
7. Heins, H. C., Nance, N. W., and Ferguson, J. E.: Social support in improving perinatal outcomes: the resource mothers program. Obstet Gynecol 70: 263–266 (1987).
8. Oakley, A., Rajan, L., and Grant, A.: Social support and pregnancy outcome. Br J Obstet Gynaecol 97: 155–162 (1990).
9. Olds, D. L., Henderson, C. R., Tatelbaum, R., and Chamberlin, R.: Improving the delivery of prenatal care and outcomes of pregnancy: a randomized trial of nurse home visitation. Pediatrics 77: 16–28 (1986).
10. Spencer, B., Thomas, H., and Morris, J.: A randomized controlled trial of the provision of a social support service during pregnancy: the South Manchester family worker project. Br J Obstet Gynaecol 96: 281–288 (1989).
11. Villar, J., et al.: A randomized trial of psychosocial support during high-risk pregnancies. N Engl J Med 327: 1266–1271, Oct. 29, 1992.
12. Gomby, D. S., Larson, C. S., Lewit, E. M., and Behrman, R. E.: Home visiting: analysis and recommendations. *In* The future of children, vol. 3, No. 3, edited by R. E. Behrman. The Center for the Future of Children, the David and Lucile Packard Foundation, Los Altos, CA, 1993, pp. 6–22.
13. Flay, B. R.: Efficacy and effectiveness trials (and other phases of research) in the development of health promotion programs. Prev Med 15: 451–474 (1986).
14. Rossi, P. H.: Issues in the evaluation of human services delivery. Evaluat 2: 573–599 (1978).
15. Rogers, M. M., Peoples-Sheps, M. D., and Suchindran, C.: Impact of a social support program on teenage prenatal care use and pregnancy outcomes. J. Adolesc Health. In press.
16. Robinson, M. A.: Management in the South Carolina resources mothers' program: the importance of supervision. *In* Learning through supervision and mentorship to support the development of infants, toddlers and their families: a source book, edited by E. Fenichel. Zero to Three/National Center for Clinical Infant Programs, Arlington, VA, 1992, pp. 120–125.
17. Bragonier, J. R., Cushner, I. M., and Hobel, C. J.: Social and personal factors in the etiology of preterm birth. *In* Preterm birth: causes, prevention, and management, edited by F. Fucks and P. G. Stubblefield. MacMillan Publishing Co., New York, 1984, pp. 64–85.
18. Norbeck, J. S., and Tilden, V. P.: Life stress, social support, and emotional disequilibrium in complications of pregnancy: a prospective, multivariate study. J Health Soc Behav 24: 30–46 (1983).
19. Newton, R. W.: Psychosocial aspects of pregnancy: the scope for intervention. J Reprod Infant Psychol 6: 23–39 (1988).
20. Nuckolls, K. B., Cassel, J., and Kaplan, B. H.: Psychosocial assets, life crisis and the prognosis of pregnancy. Am J Epidemiol 95: 431–441 (1972).
21. Oakley, A.: Is social support good for the health of mothers and babies? J Reprod Infant Psychol, 6: 3–21 (1988).
22. Halpern, R., Larner, M., and Harkavy, O.: The child survival/fair start initiative in context. *In* Fair start for children: lessons learned from seven demonstration projects, edited by M. Larner, R. Halpern, and O. Harkavy. Yale University Press, New Haven, CT, 1992, pp. 246–256.
23. Lilley, J., and Forster, D. P.: A randomised controlled trial of individual counselling of smokers in pregnancy. Public Health 100: 309–315 (1986).
24. Sexton, M., and Hebel, J. R.: A clinical trial of change in maternal smoking and its effect on birth weight. JAMA 251: 911–915, Feb 17, 1984.
25. Windsor, R. A., et al.: The effectiveness of smoking cessation methods for smokers in public health maternity clinics: a randomized trial. Am J Public Health 75: 1389–1392 (1985).
26. Altman, D.: The challenges of services integration for children and families. *In* Effective services for young children: report of a workshop, edited by L. B. Schorr, D. Both, and C. Copple. National Academy Press, Washington, DC, 1992, pp. 74–79.
27. Kessner, D. M., et al.: Infant death: an analysis by maternal risk and health care. *In* Contrasts in health status, vol. 1. National Academy Press, Washington, DC, 1973, pp. 1–203.