

Rochester Health plan

* ROCHESTER HEALTH PLAN

UNIVERSITY OF
ROCHESTER
MEDICAL CENTER

Date: _____

David L. Olds, Ph.D.
601 Elmwood Avenue, Box HWH
Rochester, New York 14642
(716) 275-3738
Fax: (716) 442-6112

202-973-1037

To: _____

Ms. Madge Henning
1120 Vermont Ave. N.W.
→ Clinton/Bore Transition
10th Floor
Office of Mrs. Clinton
Washington, D.C.

20720

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|---|---|
| ☐ For your direct reply | ☐ To note and return |
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Carnegie Corporation of New York

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David A. Hamburg, M.D.
President

30 DEC 1992

December 23, 1992

Hillary Rodham Clinton
Attention: Melanne Verveer
Clinton Transition Office
1120 Vermont Avenue, N.W.
Washington, D.C. 20270

Dear Hillary:

When we met a couple of weeks ago, you expressed interest in the notion I put forward about a White House Forum for Children and Youth. Such a forum would be an entirely logical and highly appropriate expression of your deep commitment to improving prospects for young people of this country and their families.

Such a forum could be broadly integrative in spirit with a strong mutual aid ethic. It would be a convenient and attractive place for sharing information and ideas among leaders from the many departments and agencies of government that have a substantial bearing on child and adolescent development. Moreover, it could connect these federal entities with outsiders --e.g. from state government, business, universities, and foundations. It could foster a rapid spread of information and ideas among people who have a fundamental commitment to the well-being of children and youth--or at least have a sympathetic interest.

As I see it, it would not be a decision-making body, at least not in the beginning. It would be informal, yet highly consequential because of the significance of the participants, the stimulation of the meetings, and perhaps most importantly, because of your inspiration.

Each meeting could be devoted to one big problem or big idea. For example, the opening presentation in the early sessions could be made by an outsider in search of fresh perspectives. Then responses could come from several government people, each from a different department or agency. This could be followed by open discussion. That is, of course, only one model. Many others are equally plausible.

Hillary Rodham Clinton
December 23, 1992
Page Two

These sessions could be bipartisan and could involve many different sectors of American society to the extent that you wish to do so. Of course, you might find it useful to have some sessions more restricted in composition, essentially in the family.

Incidentally, if you would prefer such a meeting to be conducted independently with foundation support, that could probably be done in a stimulating way. It would have to be our traditional, arms-length--yet sympathetic and friendly (in this case, very friendly)--relationship with the government.

No doubt, Rosalynn Carter had told you about her experience with the President's Commission on Mental Health. It provides another model. She had a small professional staff, headed by Betty who was director of studies for the commission. They provided her with excellent materials on the mental health problems that the commission was addressing and she was able to put them to good use in a variety of contexts. Rather than a commission, you could have an advisory group, formal or informal, to augment your professional staff.

Clearly, the theme of a White House Forum on Children and Youth has many variations. I intend these remarks only to warm up your circuits. If you find the theme congenial, you will no doubt think of better variations. If you would like to pursue this in any way, shape or form, please do not hesitate to ask for my help.

With very best regards,

As always,



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With very best regards,

As always,

A handwritten signature in cursive script, appearing to read "Bill", is positioned below the typed phrase "As always,".

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17 DEC 1992

David A. Hamburg, M.D.
President

December 16, 1992

Hillary Rodham Clinton
Attention: Melanne Verveer
Clinton Transition Office
1120 Vermont Avenue, N.W.
Washington, D.C. 20270

Dear Hillary:

My colleagues and I have given a lot of thought to the questions you raised about immunization, Head Start, and elementary education. Enclosed is a set of carefully selected materials -- no doubt too much with all you have on your plate, but useful for scanning, selective reading, and raising further questions that we will gladly pursue.

In our recent conversation you asked for information on three subjects.

1) **Immunization:** Enclosed is a memorandum and selected articles on ways to increase the rate of immunization among young children in this country, including lessons from other countries.

There are several contacts who could be useful in providing more details about data gaps in immunization and surveillance. The National Vaccine Program Officer, Kenneth J. Bart (301/443-6264), of Kimi Lin in his office, could be helpful. The Associate Director of the National Center for Health Statistics, Jacob Feldman (301/436-7026), or Mary Grace Kovar in the same organization, might also be helpful in identifying gaps in health statistics for children under four years old.

It would be an effective, positive message on children for the President to sign the Convention on the Rights of the Child, a prerequisite to Senate ratification. Reservations to the convention can be worked out prior to the ratification. Signing by the President is a first step. One hundred and twenty nations have ratified the convention so far.

Hillary Rodham Clinton
December 16, 1992
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2) **Chapter 1:** Enclosed is the summary and copy of the full report of the independent Commission on Chapter 1, which was released on December 10. Although the Commission did not achieve consensus on some of its recommendations, notably those on finance equity and early assessment, it did achieve substantial consensus on a new framework for Chapter 1. The commission was funded by the MacArthur and Edna McConnell foundations and Carnegie Corporation is supporting its dissemination and follow-up. If you would like to discuss the report with a small group of commissioners, the following group would cover most aspects of the report -- David Hornbeck, chair; Mike Smith (Stanford) or Bob Slavin (Johns Hopkins), research; Ben Canada, perspective of an urban superintendent (Jackson, Mississippi); Phyllis McClure (NAACP), knowledgeable about the entire history of Chapter 1 and chair of the congressionally mandated study of the program, which will release its report sometime next year.

3) **Head Start:** There is not a single, good summary of the current status of and research on the Head Start Program, so enclosed are several items on early intervention that might be useful:

- a) Report of the Silver Ribbon Panel on ways to improve quality;
- b) A 1992 review of research on early intervention programs by Sharon and Craig Ramey;
- c) An article on the differential effectiveness of model programs and Head Start by a critic of Head Start, Ron Haskins;
- d) A chapter from Ed Zigler's new book on future directions for the program;
- e) A memo from Ray Collins, formerly with the Head Start bureau, on the planning necessary for any expansion.

Finally, enclosed is the table of contents and a chapter from a soon-to-be-published book on early childhood and early grades program by Bob Slavin and his colleagues at Johns Hopkins. The chapter reviews programs for birth to three-year-olds and is part of the research base for a 0-3 component of Head Start being suggested by the Carnegie Task Force on Meeting the Needs of Young Children, chaired by Dick Riley. The chapter does not cover the recent growth of parent education programs, evaluations of which are just now developing. (The National Council of Jewish Women, for example, is coordinating evaluations of the HIPPY program.)

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We will write again soon with further thoughts in response to your question about which programs work. Certainly, one of the clear characteristics of many effective programs for children and youth is that they cut across traditional bureaucratic lines, suggesting that one of your highly significant roles could be to review issues and programs that cut across cabinet departments.

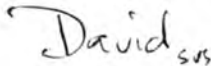
In addition, you asked me about excellent public managers who would be effective at the sub-cabinet level. I turned to friends at Harvard's Kennedy School of Government who play close attention to such matters. I pass along their suggestions. I am sending them to Dick Riley as well.

I also turned to Bob Ball, long-time Commissioner of Social Security, and my model of exemplary public service, for advice about excellent public managers. He highly recommends Lawrence Thompson and Alice Munnell. I am sending this information to Dick Riley as well. As a bonus, I am throwing in a short memo from Bob Ball to the President-Elect that I believe is helpful.

Please do not hesitate to ask whenever you feel we could be helpful.

With deep respect and every good wish,

As always,

A handwritten signature in cursive script that reads "David" followed by a small "sr" subscript.

David A. Hamburg, M.D.
President

Enclosures

Dictated by Dr. Hamburg and
signed in his absence

OPTIONS FOR AN INCREASED FEDERAL ROLE IN CHILDHOOD IMMUNIZATION

BACKGROUND

Immunizations benefit not only the children who are vaccinated but the entire population. Immunization is the most cost-effective preventive health service available. Every dollar spent on immunization saves at least \$10 in later direct costs of treatment; full immunization of all children saves lives, prevents suffering and saves money. While almost full immunization of children of school age is achieved because it is mandated by state laws, the status of U.S. children under age four with respect to immunizations is poor -- one-third to one-half of young U.S. children are not fully immunized. Low immunization rates in this country, however, also reflect many families' inadequate access to care, including preventive services, and major unsolved barriers imbedded in the current health care delivery system. These include requirements for enrollment in well-baby clinics in order to be immunized, immunizations being available by appointment only, requirements for physical examination prior to immunization, administration fees, inadequate clinical hours, too few clinic locations, cultural and language barriers, inappropriate health educational materials, inefficient immunization record-keeping systems that do not allow programs to track or notify families routinely when vaccinations are due, and inadequate numbers of clinical personnel to provide vaccination. Essential changes in the childhood immunization system need to be made.

The Federal government has developed an action plan to improve the nation's access to immunization services and to monitor and catalyze its implementation (see Public Health Reports, May-June 1992, 107:243-256, attached). This plan calls for increasing coordination among Federal health, income, housing, education, and nutrition programs, reducing policy and management barriers that limit access to delivery systems, and strengthening the delivery infrastructure. The 1993 budget includes a \$24.5 million increase to address delivery and access problems. Nonetheless, cost and barriers to access remain major problems.

Relatively low cost opportunities for an increased Federal role in childhood immunization efforts exist. Specifically the Federal government, in cooperation with state and local public health agencies and volunteer organizations, can take a major leadership role to raise public awareness, improve deficient delivery systems, enhance surveillance of children's immunization status, and increase the number of young children who are fully immunized.

Of course, any health care reform that is adopted should include coverage for childhood immunizations.

OPPORTUNITIES TO INCREASE IMMUNIZATION COVERAGE AMONG YOUNG CHILDREN

1. The Federal government could establish coordinated systems for immunization of young children. Although inner-city and preschool children are often described as hard to reach, many of these children are in regular contact with public assistance programs such as the Special Supplemental Food Program for Women, Infants, and Children (WIC) and Aid to Families with Dependent Children (AFDC) that typically see enrolled families every month. Unvaccinated children could be referred for vaccination with appropriate follow-up or vaccinated on-site in WIC or AFDC clinics or offices. In addition, Medicaid and its child health component, the Early and Periodic Screening, Diagnosis, and Treatment (EPSDT) program, should be integrally involved in tracking children in need of immunizations and providing adequate reimbursement for the service. Just as existing infrastructure can be used for immunization, community organizations and infrastructure set up for vaccination can be used also for preventive and primary care. Expanded immunization can be the entry point for better health care for young children.
2. Federal resources should be provided to track immunization status of preschoolers and to enhance surveillance, particularly in high-risk inner-city and rural areas. The last data available are from 1985. Improved surveillance will foster better decision making and long-range planning and assessment of progress and need.

Currently, most United States communities have no idea as to the rate of immunization within their toddler population under two years of age, while any Village Health Worker in India is sure to know. The World Health Organization/Expanded Program on Immunization developed an immunization coverage survey tool that is now being considered in many California counties and cities in order to assess levels of immunization and to provide data to better inform for policymakers. The Children's Defense Fund estimates that a tracking and surveillance system would cost an estimated \$100 million.

3. The President and Congress could enact a universal vaccine purchase and distribution system. Cost of vaccines has increased twenty fold since 1977. The exact cost depends on the vaccine prices negotiated with the manufacturers, but a considerable amount of this cost would be offset by savings to the states and private insurers. This option, suggested by the Children's Defense Fund, could be pursued through a budget request only, or through the submission of legislation.

In the short term, the Centers for Disease Control and Prevention could negotiate bulk prices for vaccine purchase and distribution for all federally funded programs that immunize children and programs for persons with AIDS and homeless children and families.

4. Federal leadership at the highest level is needed to mobilize the nation to assure that all children are fully immunized. Many parents of inner-city pre-school children lack information about the importance of immunizing their children at the recommended ages and of where to go for immunizations. The President, the First Lady, or a designee, could help launch a major childhood immunization campaign using the mass media--television and radio--(possibly with donated time) in conjunction with public sector agencies, volunteer organizations and other private sector groups to make parents, especially those who may be isolated from the health care system, demand immunizations for their children. This strategy worked well in Colombia and many other countries. (See attached lessons learned from other countries.)

FACT SHEET ON CHILDHOOD IMMUNIZATIONS

- Several serious and sometimes life threatening infectious diseases are almost completely preventable through routine childhood immunizations. These include diphtheria, pertussis, tetanus, poliomyelitis, *Haemophilus influenzae type b* diseases, infection, measles, mumps, rubella, and hepatitis B.
- The current childhood immunization system in the United States is a patchwork of public and private sector efforts that includes participation of private physicians and local, state, and federal governments. Half of all vaccines are administered in the private sector and half are administered in the public sector.
- The public sector cost to immunize a child is estimated to total \$113.20 (parents may pay an additional \$5 administrative fee). The private-sector prices for the vaccines each child should receive are estimated to total \$230.39, with an additional estimated cost per physician visit of \$15; the total for full immunization would be \$464.39. In India, the cost of fully immunizing a child is \$2.00.
- Currently, all 50 states and the District of Columbia have immunization laws or requirements for students in some or all grades from kindergarten through grade 12 and children attending licensed day care facilities. Immunization levels are 97 to 98 percent at the time of enrollment in school, but are reported to be 50 percent or less among 2-year-old children in some inner-city populations. The United States is far behind most European nations and Canada and many less developed countries. For example, in Norway 90% of children are immunized against diphtheria, tetanus, and whooping cough by age 3. In 1990-91, the percentage of one year olds who were fully immunized in India was 89%, Burundi 89%, Canada 85%, UK 85%, and Sweden 99%.
- In 1985 the U.S. Immunization Survey was discontinued; thus current, reliable rates of immunization prior to school entry in the United States are not available.
- The United States failed to meet a key objective for 1990 -- that by 2 years of age 90% of children would be immunized against the major childhood diseases, especially measles.
- Failure to immunize preschool children fully resulted in about 30,000 cases of measles in this age group between 1989 and 1991. In 1983, there was a total of 1497 cases in all age groups. Thus, while less developed countries were improving childhood immunizations dramatically, in the United State they were declining at least in part because of the increase in poverty among children in the last decade.
- Minority children in urban areas are 4 to 9 times more likely to contract measles than are white children of the same age.

- Adequate population coverage by immunization depends on understanding the importance of immunizations and seeking them out, access to care, and "user friendly" provider practices. Barriers to successful immunization for all children include (1) missed opportunities for administering vaccines, for example, failure to assess immunization status in acute-care settings is a missed opportunity because many inner-city children are brought to these settings for routine care; (2) high cost of vaccines and resource shortfalls in the health care delivery system; (3) inadequate access to care; and (4) incomplete public awareness of and lack of public request for immunization.

LESSONS FROM OTHER COUNTRIES

According to UNICEF, 80% of the world's children are now immunized. The institutional legacy of immunization systems is its use for preventive and primary care, increasing contact of children with health providers, and at the same time reducing the unit cost of other health services. Social resources and communication channels have been mobilized behind a major health improvement as a recognized social goal.

Example

Ceara, Brazil, population 6 million, two-thirds of whom are below the poverty line, increased immunization levels by 40% by:

- Surveying the population, and monitoring of immunization and of disease.
- Providing all families with information on need for vaccination.
- Leadership by state government in appealing to the church, nongovernment organizations, mass media, businesses (health messages on bank statements) and the Pediatrics society. Thousands of volunteers reached out to people all over the state.
- Community residents were trained as health workers, each responsible for 100 families.

Similar strategies were successful in other countries. What could the United States do?

1. Bring immunizations to the public in addition to providing "user friendly" access to institutional settings.
 - Mobile units are used in many cities already.
 - California is considering formal training and utilization of community health outreach workers on the village health worker model. This model could be tried in other places as well.
2. Mass media campaigns could use model of Partnership for a Drug Free America, or others to reach everyone. Colombia's successful campaign has 10,000 radio and TV spots in 3 months.
3. Leadership at top levels of government to enlist non-government organizations (model of Rotary International), religious organizations (especially Black churches), businesses, professional organizations, and schools (teachers have been valuable volunteers in other countries). The American Medical Association, the American Academy of Pediatrics, the Association of Family Physicians, and the American Public Health Association are already receptive, and trying to contribute to education of professionals and patients.

4. Tracking and monitoring of immunizations is accomplished by registering every child at birth, providing punch cards for immunizations with information on what they are and where to go to obtain them, notifying parents who don't come in, and sending health workers to the home of those who don't come. Community health workers could be used for this.

Variations of this system have been used successfully in many countries and could be adapted to the United States.

Factsheet on Vaccine-Preventable Childhood Diseases

Diphtheria

- Easily spread through coughing or sneezing.
- Early symptoms are a sore throat, slight fever, and chills.
- Can interfere with swallowing and cause suffocation.
- Can cause heart failure or paralysis if allowed to go untreated.
- Can be prevented with the DTP (Diphtheria, Tetanus, Pertussis) vaccine.

Tetanus

- Also known as Lockjaw.
- Enters the body through a wound.
- Produces a poison which attacks the body's nervous system.
- Symptoms are headache, irritability, and stiffness in the jaw and neck.
- Eventually causes muscle spasms in the jaw, neck, arms, legs, and abdomen.
- May require intensive hospital care.
- In the U.S., three out of every 10 people who get tetanus die from it.
- It is preventable through use of DTP vaccine.

Pertussis

- Also known as whooping cough.
- Highly contagious.
- Causes severe spells of coughing which can interfere with eating, drinking, and breathing.
- Complications may include pneumonia, convulsions, or encephalitis (inflammation of the brain).
- In the U.S., about 65% of reported cases occur in children under 5, and half of those are infants less than 1 year old.
- In recent years, an average of 3,500 cases have been reported in the U.S.
- It is preventable through use of DTP vaccine.

Polio

- Serious cases cause paralysis and death.
- Mild cases cause fever, sore throat, nausea, headaches, and stomach aches. Pain and stiffness in the neck, back, and legs also occur.
- Can be prevented by immunization with a weakened strain of the live polio virus taken orally — OPV (oral polio vaccine).

Measles

- Highly contagious
- Causes a rash, high fever, cough, runny nose, and watery eyes, lasting for one or two weeks.
- Causes ear infections and pneumonia in one out of every 20 children who get it.
- Causes encephalitis that can lead to convulsions, deafness, or mental retardation in one out of every 1,000 children who get it.
- Of every 1,000 children who get measles, one or two will die.
- If not immunized with MMR (measles, mumps, rubella) vaccine, a person will most likely contract the disease at some time in his or her life.

Mumps

- Causes fever, headache, and inflammation of the salivary glands, resulting in swelling of cheeks or jaw.
- One out of every 10 who get mumps may develop meningitis (inflammation of the coverings of the brain and spinal cord). Sometimes causes encephalitis.
- Can result in permanent loss of hearing.
- MMR vaccine prevents this disease.

Rubella

- Also known as German Measles.
- Most serious in pregnant women; there is an 80% chance that it will cause defects in the unborn child if infection occurs early in pregnancy.
- Symptoms include mild discomfort, slight fever for 24 hours, and a rash on the face and neck, lasting for two or three days.
- MMR vaccine prevents this disease.

Haemophilus influenzae type b

- Also known as Hib disease.
- Strikes one child out of 200 before the fifth birthday.
- More serious in infants under one year of age.
- After age five, risk of contracting the disease is slim.
- Causes pneumonia and infections of the blood, joints, bones, soft tissues, throat, and the covering of the heart.
- Causes meningitis in about 12,000 children per year; about one in four suffers permanent brain damage, and about one in 20 dies.
- Hib vaccine prevents this disease.

Hepatitis B Virus

- Infants born to HBV-infected mothers have up to an 85% chance of getting the infection.
- HBV infection is spread within families and communities.
- Infection at birth or during early childhood can result in long-term chronic illness.
- Chronically infected persons can develop chronic liver disease and a rare form of cancer.
- HBV vaccine prevents this disease.

GENERAL ARTICLES

The Public Health Service Action Plan to Improve Access to Immunization Services

THE INTERAGENCY COMMITTEE TO IMPROVE ACCESS TO IMMUNIZATION SERVICES

The Committee was established in January 1990 by Dr. James O. Mason, Assistant Secretary for Health, to develop an Action Plan to improve the nation's access to immunization services and to monitor and catalyze its implementation. The following persons, members of the Committee, participated in preparing the Action Plan.

National Vaccine Program Office, Kenneth J. Bart, *Chairman*, Chester A. Robinson, *Executive Secretariat*

Centers for Disease Control, Roger H. Bernier, Walter A. Orenstein, Stephen J. Sepe

Health Resources and Services Administration, Vito Caserta, David E. Hepple, Joe Iser, Coleen Kivlahan, Cynthia G. McCormick, David B. Snyder, Lynn Spector, David Stevens, Phylis Stubbs

Indian Health Service, George Brenneman, Jerry Lyle
Office of the Assistant Secretary for Planning and Evaluation, Cheryl Austein

Office of Health Planning and Evaluation, Lorraine Fishback
Office of Minority Health, Georgia Buggs, John Walker

Office of the Surgeon General, Dushanka V. Kleinman
National Institutes of Health, Regina Rabinovich

Administration for Children and Families, Diann Dawson, Lisa Matras

Health Care Financing Administration, William Hiscock
Department of Agriculture, Janice G. Lilja, Marie Mitchell,

Ron Vogel
Department of Education, Jack MacDonald, Patrick Hogen

Department of Housing and Urban Development, Edward Auerback, Bertha Jones

National Vaccine Advisory Committee (Liaison), Kay Johnson
Editorial and support staff, Chester A. Robinson, Jeannette DeLawter, Aeylonda Genus

Tearsheet requests to Chester A. Robinson, Office of the Assistant Secretary for Health, NVPO, Parklawn Bldg., room 13A-56, 5600 Fishers Lane, Rockville, MD 20857; tel. (301) 443-6683.

Synopsis

The Public Health Service's Interagency Committee to Improve Access to Immunization Services (ICI) has responsibility for improving the immunization protection of the nation's children and other vulnerable populations. ICI's Action Plan to Improve Access to Immunization Services sets 14 goals with 120 action steps for improving immunization services nationwide by (a) increasing coordination among Federal health, income, housing, education, and nutrition programs; (b) reducing policy and management barriers that limit access to delivery systems, and (c) strengthening the delivery infrastructure. To accomplish the goals of the plan, there is a \$72.0 million increase in funding appropriated in fiscal year 1992 specifically for this purpose. The President's Budget for fiscal year 1993 includes a \$24.5 million increase for continued program implementation. The additional resources will be used to address delivery and access problems, which have been determined to be the primary factors limiting immunization for many children.

THE PUBLIC HEALTH SERVICE (PHS), through its National Vaccine Program Office (NVPO), chairs and provides staff support to the Interagency Committee to Improve Access to Immunization Services (ICI).

ICI members include representatives from the Department of Health and Human Services (DHHS) agencies and offices with responsibilities for implementing the Plan. They are from the Office of the Assistant Secretary for Health, with its Office of the Surgeon General and Office of Minority Health; the Centers for Disease Control; the Health Resources and Services Administration;

the Indian Health Service; the Health Care Financing Administration; and the Administration for Children and Families. The Committee includes liaison representatives of the Department of Agriculture's Special Supplemental Food Program for Women, Infants, and Children; the Department of Education; and the Department of Housing and Urban Development's Program for Indian and Public Housing.

ICI's Action Plan to Improve Access to Immunization Services assesses the status of immunization services nationwide, sets goals for providing immunization services for at-risk populations, and details

the steps needed to accomplish them (1). The plan has 14 goals with 120 action steps for improving immunization services nationwide by

- increasing coordination among Federal health, income, housing, education, and nutrition programs,
- reducing policy and management barriers to make delivery systems more accessible, and
- strengthening the delivery infrastructure.

ICI developed the Plan in response to the DHHS Secretary's Program Directions (2). Direction 8 provides for increased access to immunization services for children from birth to 5 years of age and emphasizes services for high-risk and hard-to-reach populations. Direction 9 directs PHS agencies to develop new approaches to raising the immunization coverage of minority populations at high risk. The plan also responds to recommendations for improving access to immunization services presented in the report of the National Vaccine Advisory Committee (NVAC), "The Measles Epidemic: The Problems, Barriers and Recommendations" (3).

Many of the activities described in the Plan require no additional resources and are either planned or already being implemented. The Plan provides for new initiatives and for expanding many existing activities. Those that require additional funding for this year have been covered by the additional \$72.0 million already appropriated in fiscal year 1992 specifically for this purpose. Further funding of \$24.5 million needed to implement fully the Plan's requirements for fiscal year 1993 has been included in the President's budget request. This would provide for a total increase of \$96.5 million over these 2 years. The additional resources will be used to further progress toward the goals in the Plan by focusing on delivery and access problems, the primary factors limiting immunization for many children.

While the potential of emerging biotechnology to improve existing vaccines and to develop new ones is great, our primary health care delivery system is encountering difficulties in immunizing all children. In many areas, segments of the population continue to experience diminished health status, particularly the most vulnerable populations—the very young, the elderly, and those of low socioeconomic status—face increased risks for vaccine-preventable diseases.

Immunization coverage may be regarded as incomplete when an insufficient percentage of the total population is immunized or when significant

numbers of critical segments of the population, such as children or the elderly, lack partial or complete immunization protection.

Current recommendations call for a child to receive eight different vaccines or toxoids (many in combination form and all requiring more than one dose) in a total of five visits for immunization between birth and school entry. The basic immunization schedule of the U.S. Public Health Service's Immunization Practices Advisory Committee (ACIP) is summarized in the table.

An estimated 40 to 50 percent of the nation's children have received a full series of individual immunizations by their second birthday; however, the proportion who have received the full course of all immunizations is doubtless lower. There are marked variations around the country. In particular, immunization levels among poor, inner-city children may be substantially lower. A survey in early 1990 of kindergarten and first-grade public school students in eight inner city areas (Boston, MA; Bronx, NY; Cleveland, OH; Houston, TX; Jersey City, NJ; Phoenix, AZ; Pittsburgh, PA; and Seattle, WA) revealed that, although more than 95 percent had received measles vaccine by the time of school entry, only 51 to 81 percent, depending on the city, had received the vaccine before their second birthday. Some had been vaccinated only shortly before entering school to comply with school immunization requirements and thus had been at risk of disease for several years.

The measles epidemic is cause for serious concern. But measles, being the most contagious of the vaccine-preventable diseases, is also an indicator that signals a failure in the vaccine delivery system. Given low immunization levels among young children, it is reasonable to suspect that there are substantial numbers of children who are now also susceptible to pertussis, poliomyelitis, mumps, and rubella. Likewise, Hemophilus type b disease, which is now preventable by vaccination, continues to be a serious problem.

Many reasons for incomplete immunization coverage may be found within the health care system, which itself may create policy and administrative barriers to immunization. The health care system frequently fails to take advantage of opportunities to provide vaccines to at-risk persons, particularly children, during regular visits to health care facilities. Barriers which inhibit access to immunization result from insufficient State and local resources, leading to inadequate levels of nursing staff and inconvenient clinic hours and locations. Such barriers are compounded by health care providers' lack

Recommended child vaccination schedule of the Public Health Service's Immunization Practices Advisory Committee

Age	DTP ³	Poliomyelitis ⁴	MMR ⁵	HIB ¹		HBV ²	
				Option 1	Option 2	Option 1	Option 2
Birth						X	
1-2 months						X	X
2 months	X	X		X	X		
4 months	X	X		X	X		X
6 months	X			X			
6-18 months						X	X
12 months					X		
15 months	⁶ X	⁶ X	⁷ X	X			
4-6 years ⁸	X	X	⁹ X				

¹ HIB = *Hemophilus b* conjugate vaccine. HIB vaccine is given in either a 4-dose schedule (option 1) or a 3-dose schedule (option 2), depending on the type of vaccine used.

² HBV = hepatitis B vaccine. HBV can be given simultaneously with DTP, poliomyelitis, MMR, and *Hemophilus b* conjugate vaccine at the same visit.

³ DTP = diphtheria, tetanus, and pertussis vaccine, combined.

⁴ Poliomyelitis vaccine may be live oral polio vaccine in drops (OPV) or killed

(inactivated) polio vaccine by injection (IPV).

⁵ MMR = measles, mumps, and rubella vaccine, combined.

⁶ Many experts recommend this vaccine at 18 months of age.

⁷ In some areas, this dose of MMR vaccine may be given at 12 months.

⁸ Before school entry.

⁹ Many experts recommend this dose of MMR vaccine be given at entry to middle or junior high school.

of knowledge about valid contraindications for vaccination.

The goals and objectives in the plan provide a substantive response to these diverse needs by focusing on more interactive relationships between health, income, housing, educational, and nutritional programs. However, if we are to successfully effect changes in the immunization system, the nation must make a renewed commitment and accept this shared responsibility. Responsibility is shared by Federal, State, and local governments; the private sector; the medical community; and by individual families.

The Plan recognizes the need to link every child to a primary health care system with immunization as an integral part of that system. The Plan reflects the Department's commitment to achieve universal immunization coverage. The Plan's goals and objectives are viewed not as rigid obligations, but as dynamic guides to be altered to fit changing conditions and levels of understanding of the problems at hand.

The Immunization System

The nation's immunization services are provided through an integrated system, with the Federal, State, and local governments; the private sector; and voluntary organizations playing important roles. About half the children receive immunization provided by the public sector, often as a specific, categorical service independent of other preventive care services. Their parents do not pay for the vaccines received, which at public sector prices are estimated to total \$113.20, but they may pay a small amount for the vaccine, about \$5. Such children

are likely to be members of racial or ethnic minorities and socio-economically disadvantaged.

Other children are immunized by private physicians as part of their overall well-child preventive care. Their parents either pay for the service or have it paid for by third-party reimbursement mechanisms. The private-sector prices for the vaccines each child should receive are estimated at a total of \$230.39, with an estimated cost per physician visit of \$15; the total for full immunization would be \$464.39.

Since the passage of the Vaccination Assistance Act of 1962, a Federal grant program has provided financial and technical assistance to supplement State and local health department efforts to provide immunization through public sector agencies. Grant funds typically provide about half of the cost of public sector vaccination, about one-quarter of the national total.

The level of funding for this program has increased dramatically in the past 16 years, from \$5 million in fiscal year 1976 to the 1992 fiscal year appropriation of \$259 million. The striking increases are largely a response to dramatic increases in vaccine prices and the introduction of new vaccines. This has occurred in spite of the establishment of the National Vaccine Injury Compensation Program, which has had a moderating effect on increases in vaccine prices and malpractice suits, and therefore improved the availability of vaccines. Grant funds have not paid for the actual administration of vaccine; this typically comes from local or State health department funds, although some funds from the Federal Prevention Services Block Grant, Maternal and Child Health Block Grant, or Medicaid may be used.

The Problem

Substantial numbers of preschool children are not being immunized. Immunization levels have been chronically low, particularly in some cities where resources for vaccine delivery are inadequate. Low levels are believed to have contributed to the present measles epidemic. Other reasons for low immunization rates are within the health care system, which itself may limit access to immunization services and may fail to use opportunities to provide vaccines to at-risk persons during regular visits to health care facilities.

Barriers to successful immunization are of four key types. Each can be addressed within the context of the current primary health care system. They are

- missed opportunities for administering vaccines,
- resource shortfalls in the health care delivery system,
- inadequate access to care, and
- incomplete public awareness and lack of public demand for immunization.

As a nation, we have fallen short of clear and achievable goals in areas where specific means for preventing diseases exist. Children have died of measles as a result of being unvaccinated. During 1989, 18,189 measles cases and 41 deaths were reported, the largest number since 1978. The toll was more than 10 times the all-time low of 1,497 cases reported in 1983. In 1990, the number of measles cases rose to 27,786, with an estimated 89 deaths. This measles epidemic caused the largest annual number of reported deaths from measles in more than two decades, and caused morbidity in thousands of others, all fully preventable. These children usually are in medically unserved and under-served groups, such as inner-city minority populations.

Perhaps most disturbing is that the NVAC report on measles shows that the measles epidemic is indicative and predictive of other immunization problems in our primary health care delivery system. These problems typically fall into the following broad categories.

Lack of community awareness and demand for services. Reports indicate that in some communities parents may be isolated from the health care system and may have only a limited appreciation of the importance of beginning immunization in infancy. Lack of information about the importance of im-

munization has reduced the demand for services, resulting in low levels of immunization coverage.

Health delivery system barriers. Although the total Federal resources being provided for immunization are considerable, and publicly funded clinics provide an essential source of preventive care for low-income families, many clinics lack the resources to serve adequately all families in need of service. Many immunization programs across the country have inadequate resources, leading to insufficient clinic staff, inadequate clinic hours, and few or inconvenient locations to be able to reach successfully the populations they are expected to serve. Many insurers do not cover vaccinations, forcing physicians and other health care providers to pass on costs to parents or to refer the parents to already overtaxed public clinics.

The failure to vaccinate adequately many children currently enrolled in public assistance programs suggests that many of the potential benefits gained by recent expansions in Medicaid eligibility to a much larger group of poor or near-poor pre-schoolers may not be realized unless steps are taken to assure that immunization is an integral component of primary health care activities.

An epidemic of a vaccine-preventable disease among unvaccinated children causes concern about our capacity to deliver vaccines. There is evidence of long-standing difficulty in reaching certain high-risk populations. There have been recent reports of a deterioration of the immunization delivery system, particularly in the inner cities. This situation has produced accumulations of large numbers of very young, unprotected persons.

Participation of health care providers. Physicians, nurses, and other health care providers, including midwives, have a key role in influencing attitudes of patients regarding appropriate immunization. Shaping the attitude and future practices of these health care providers is critical to ensuring that they offer appropriate counseling and information about immunization to their patients. This is relevant since some studies have shown that in spite of widespread communications and product advertising among physicians, their acceptance of vaccines, particularly new ones, can be quite slow.

Improved coordination. Maintaining and extending control of infectious diseases through immunization is an important national objective. Additional action is required at all levels of the public sector, including Federal, State, and local governments. Im-

proved coordination is needed in the private sector among physicians, health insurance companies, and parents. All sectors of society are partners that share the responsibility for insuring that all of the nation's children, especially those most in need, are appropriately immunized.

In implementing the Plan, the Secretary has reaffirmed the Department's immunization and infectious disease control priorities for the nation. As described in "Healthy People 2000" (4), one goal is to increase childhood immunization levels to at least 90 percent of the 2-year-old children by the year 2000. Other goals for the year 2000 are to eliminate measles, diphtheria, poliomyelitis, rubella, and tetanus and to substantially reduce the cases of pertussis and mumps.

Under the Plan, remedies in a multifaceted approach include removing administrative and policy barriers, improving access to services, offering incentives to raise the priority of immunization among those providing health care services, and helping providers to understand contraindications for immunization and to recognize opportunities to offer vaccines. More opportunities to deliver immunization may be in child care settings and in programs such as the Special Supplemental Food Program for Women, Infants, and Children (WIC), and Aid to Families with Dependent Children (AFDC).

The strength of the Plan is its diversity of approaches in the delivery of immunization services. It recognizes the need to assure that safe and effective vaccination services are available for the general population, as well as the widely disparate immunization needs of especially vulnerable populations, such as the very young, women of reproductive age, and members of minority groups, who will require more attention.

The main thrust of the Plan is action. Commitments have been made to undertake specific activities and make significant progress within the next 4 years. The Plan includes ambitious goals, balanced with the need to define realistic expectations, within available resources, and defined needs for additional resources as necessary. Through the combined authorities, programs, and resources of the participating agencies and departments, the Federal Government can provide the necessary leadership and framework for bringing about lasting improvements in the nation's immunization system.

Estimated Costs

The Plan draws on the expertise and resources of Federal agencies and departments and provides pro-

grammatic initiatives in keeping with their missions. Many of the activities identified in the Plan require no additional resources and are already implemented or planned. Some require very little funding. Others require significant additional funding. Those that require additional funding for this year have been covered by the additional \$72.0 million already appropriated in fiscal year 1992 specifically for this purpose. Further funding of \$24.5 million needed to implement fully the Plan's requirements for fiscal year 1993 have been included in the President's budget request. This would provide for a total increase of \$96.5 million over these 2 years. Firm estimates for outlying years for these activities are uncertain at this time. The results of the Infant Immunization Initiatives and various demonstration projects will help identify optimal delivery mechanisms for immunization services. The results of these studies are expected to be available beginning in 1993.

With the implementation of the Plan, we may expect measurable progress in immunization levels within the next few years. However, because the Plan is a long-term solution to the control of vaccine-preventable diseases, its full impact will not be achieved until the end of the decade.

Goals of the Plan

The Interagency Committee identified 14 goals in implementing the NVAC Measles Report recommendations and the elements of the Secretary's Program Directions 8 and 9. Major implementing activities are shown in an accompanying box. The 14 goals that follow represent high yield investments in the nation's children, not merely budget costs. The cost to the nation of not implementing the program would be much more expensive.

Improving the availability of immunization

1. Continue financial support to State and local health departments, community and migrant health clinics, health care programs for the homeless, and health care in housing projects to assure the availability of immunization services. Establish new policies to assure that resources are used to improve immunization delivery rather than to substitute for current State and local efforts.

2. Work with insurers to increase coverage of immunization as part of their basic health benefits package and work with managed health care systems, including health maintenance organizations, to provide routine vaccination services. Facilitate cooperation among State and local health departments and Medicaid agencies in acquiring vaccines at the

Agency Actions and Activities to Implement the Action Plan of the PHS Interagency Committee to Improve Access to Immunization Services

Administration for Children and Families (ACF)

1. Adopt in the Program Performance Standards for Head Start programs serving infants, toddlers, and pregnant women a requirement that these programs must provide or arrange for completing all immunizations recommended by the Public Health Service's Advisory Committee on Immunization Practices.

2. Participate with Centers for Disease Control in up to five immunization demonstrations designed to increase immunization coverage among those from birth to 5 years of age who are participating in the Aid to Families with Dependent Children (AFDC) program.

3. Issue regulations under the Child Care and Development Block Grant to assure that there are requirements in effect relating to the prevention and control of infectious diseases, including immunization.

4. Require that programs have in place a system to monitor adherence to immunization requirements for all children in child care provided under the Child Care and Development Block Grant.

5. Develop and distribute to all Head Start grantees, delegates, and Parent-Child Centers information on the expanded Medicaid eligibility, including immunization services available under the Early and Periodic Screening, Diagnostic, and Treatment Program.

6. Encourage Head Start programs to actively assist families in the Medicaid enrollment process.

7. Develop and implement a plan for maintaining adherence to Child Care and Development Block Grant statutory and regulatory provisions relating to prevention and control of infectious diseases.

Centers for Disease Control (CDC)

1. Develop and distribute "Minimum Program Standards for Immunization" to all public sector clinics, including community and migrant health centers.

2. Revise the immunization grant program announcement to require that grantees adopt the set of standards as a means of evaluating public sector clinics.

3. Develop and distribute guidelines and award grants through States to up to 60 cities with documented morbidity or low vaccination coverage levels.

4. Stimulate all immunization grant projects to adopt and implement the compulsory two-dose measles requirement and monitor the progress of implementation.

5. Complete six demonstration projects (to be carried out with State and local immunization grantees) designed to evaluate different approaches to raising immunization coverage. Complete three projects designed to develop new approaches to measuring immunization coverage.

6. Enhance local demand for immunization services through the use of culturally sensitive, linguistically appropriate materials.

7. Invite private and public sector groups interested in working to improve immunization coverage to join the Healthy Mothers, Healthy Babies Coalition devoted to health education, health information, and health advocacy activities.

8. Develop and distribute guidelines and award grants to State immunization programs.

9. Develop and pilot test methods of measuring immunization coverage based on registration of all children from birth certificate information and reporting of vaccinations by all providers to a central data bank.

Health Care Financing Administration (HCFA)

1. Enhance program activities in order to increase participation of eligible children in Medicaid's comprehensive Early and Periodic Screening, Diagnostic, and Treatment (EPSDT) Program to 80 percent by 1995.

2. Conduct an EPSDT Program management review in every State. Include immunization patterns for managed or continuing care, acquisition of vaccines for Medicaid providers priced at CDC contract prices, methods of tracking children in need of immunization, and practices related to reimbursement of health care providers for immunization services.

3. Develop and issue an updated Guide to Vaccine Acquisition (using the CDC contract and distribution system) to EPSDT Program providers.

4. Provide technical assistance to improve and support immunization through EPSDT.

5. Encourage cooperative working relationships among State Medicaid agencies and health departments.

6. Explore methods by which States can track and report immunization status in EPSDT Program management.

Health Resources and Services Administration (HRSA)

1. Modify the Maternal and Child Health (MCH) Block Grant guidance for States to specifically focus on plans and activities to improve State immunization status. State's annual reporting requirements will be modified to provide a specific focus on immunization.

2. Work with the Centers for Disease Control (CDC) and State health officers to conduct regional workshops for State MCH directors; directors of the Special Supplemental Food Program for Women, Infants, and Children (WIC); immunization directors; and Medicaid (EPSDT) directors to facilitate State strategies for improving the delivery and financing of immunizations.

3. Encourage Community and Migrant Health Centers (C/MHCs) to develop strategies to increase vaccination rates among at-risk populations. Such efforts include streamlining procedures for immunization immediately before the start of the school year and the influenza season and procedures for providing immunizations at community sites, such as day-care centers, WIC local clinics, and schools.

4. Identify the States with particularly impressive immunization program activities and disseminate information on their programs. States that appear deficient in immunization activities will be identified for special technical assistance.

5. Increase efforts to monitor and help assure that C/MHC providers are informed of valid contraindication for vaccination, the advantages of the simultaneous administration of vaccines, and the advantages of the two-dose measles vaccination regime.

6. Provide increased capacity to deliver immunization services through Community Health Centers, Migrant Health Centers, Homeless Health Centers, and Housing Project Health Centers.

7. Recruit capable volunteers working with national organizations, such as the former Volunteers in Service to America (VISTA) and local community groups and others to serve in clinics or immunization sites in clerical and nursing support roles.

8. Review policies of the C/MHCs and MCH programs to identify ways to facilitate immunization via effective triage and appointment systems.

9. Use the Association of Maternal and Child Health Programs (AMCHP) network and Department of Health and Human Services' Regional Offices to determine immunization practices in local programs supported through the MCH Block Grant. The assessment will include a determination of whether appointments are re-

quired, who approves immunization of children, and whether there is a fee.

10. Work with the AMCHP network and other national and regional programs to disseminate the "Minimum Program Standards for Immunization Practice" being developed by CDC.

11. Encourage State and local governments to enact legislation to mandate appropriate immunization of children prior to enrollment in licensed day care centers.

12. Promote immunization services and education among 15 Health Start communities and undertake a national education campaign on pregnancy and infant health issues, including immunization.

Indian Health Service (IHS)

1. Institute policies and program guidelines to assure that every IHS service unit will achieve 90 percent immunization levels among those 3 to 27 months of age.

2. Require IHS Areas to have a disease control plan (with emphasis on vaccine preventable diseases) that provides for disease surveillance and outbreak control activities. The plan is to be agreed to by Federal, State, county, and tribal health departments.

3. Require IHS Areas to assess its current Hepatitis B virus (HBV) immunization activities and implement policies and procedures ensuring prenatal HBV screening and vaccination of infants at risk.

4. Require IHS Areas to obtain baseline serologic information on its service population to determine the level of HBV risk in the area.

5. Require IHS Areas to review current immunization policy and to implement appropriate revisions to include directives on pneumococcal and influenza immunization of high risk patients.

6. Assure that IHS service units have a register of infants, children, and adults who are at high risk for complications of pneumococcal or influenza infections. Based on the register, IHS service units will conduct prevention programs that ensure that high risk patients receive pneumococcal and influenza vaccines on a timely basis.

7. Assure that IHS Areas implement pneumococcal and influenza immunization programs for all clients who are at risk.

National Institutes of Health (NIH)

1. Fund research studies of the differences between host responses to natural disease and to vaccination. Support studies of the mechanisms of the immunosuppression and

autoimmune encephalomyelitis that attend cases of acute measles.

2. Support basic and clinical research to identify the measles virus components required for induction of long-lasting humoral and cellular immunity.

National Vaccine Program Office (NVPO)

1. Assist the Centers for Disease Control in the development of the framework for a public information campaign on immunization.

Office of the Assistant Secretary for Health

1. Provide public visibility to immunization issues, particularly as they relate to the preschool-age child (*Office of the Surgeon General*).

2. Continue to identify programs for collaboration between the Department of Health and Human Services and the Department of Education related to infant and early childhood health and education, as part of the health component of the First National Education Goal (*Office of the Surgeon General*).

3. Co-chair with the Centers for Disease Control the Immunization Education and Action Committee of the Healthy Mothers, Healthy Babies Coalition (*Office of the Surgeon General*).

4. Facilitate the distribution of information materials on immunization to minority community organizations, State offices of minority health, minority health professional organizations, and local and private groups serving minority populations (*Office of Minority Health*).

Department of Housing and Urban Development (HUD)

1. Improve the access and delivery of immunization services to economically disadvantaged and minority children living in public housing. Improve coordination among public health clinics, hospitals, and other health care providers; the Head Start Program; public and Native American housing child care centers and WIC clinics (Special Supplemental Food Program for Women, Infants, and Children); and Resident Management Corporations (RMC), resident councils, and other residents' entities.

2. Improve the immunization status of medically underserved infants, economically disadvantaged preschool

children, and at-risk youth in public and Native American housing. Identify barriers to immunization and initiate corrective measures to increase residents' awareness and access to service for children who are clients.

Department of Agriculture (USDA)

1. Conduct demonstration projects, in conjunction with the Centers for Disease Control (CDC), to explore various mechanisms for increasing immunization rates among WIC clinic (Special Supplemental Food Program for Women, Infants, and Children) participants.

2. Assess immunization levels of WIC clients in various types of WIC clinic settings.

3. Actively pursue with CDC a "pay per shot" immunization delivery system. Currently, immunizations are not a reimbursable administrative cost for WIC.

4. Expand the Illinois immunization assessment model to another State. This model uses an integrated computerized system to determine immunization levels of children served through the WIC Program and in various public health care settings.

5. Assess immunization levels of WIC participants in 10 sites in various types of WIC clinic settings.

6. Encourage State WIC directors to establish regular liaison and ongoing coordination efforts with State immunization program managers.

Department of Education (DoE)

1. Coordinate efforts with Health Resources and Services Administration's Bureau of Health Care Delivery and Assistance to provide priority services to migrant children to ensure that all appropriate health screening, including immunization, and diagnostic tests are performed.

2. Adopt, where feasible, common health records, including those for immunization, and a system to facilitate the continuity of services and the accurate transfer of health data.

3. Distribute health education publications and resources, including immunization and other preventive health services, directed to the children of migrant farm workers.

Six Areas Lead National Early Immunization Drive

DIANA R. WOODS
DEAN D. MASON

Both authors are with the Division of Immunization, National Center for Prevention Services, Centers for Disease Control. Ms. Woods is Public Affairs Coordinator, Infant Immunization, Mr. Mason is Coordinator of National Immunization Action Plan Development.

Tearsheet requests to Ms. Woods, Centers for Disease Control, Mail Stop E05, 1600 Clifton Rd., NE, Atlanta, GA 30333; tel. 404-639-1867.

Synopsis

On June 13, 1991, President George Bush announced in a White House ceremony a local planning effort to break down barriers and provide better access to immunization in six representative localities "to solve the problem of late immunization." (children need to be immunized appropriately by their second birthday, not just in time for school.)

The community "Immunization Action Plans" (IAP) are one of several Federal, State, and local responses to an outbreak of measles that produced 27,600 cases and 89 deaths in 1990.

The community effort and subsequent early childhood immunization plans around the country are also part of a much broader effort initiated by Secretary Sullivan as a Healthy People Year 2000 goal to increase immunization levels to at least 90 percent for the nation's children by their second birthday. These efforts also respond to 13 recommendations for improving immunization availability made by the National Vaccine Advisory Committee in January 1991. The recommendations focused on improvements in the management of immunization delivery and in methods for measuring immunization status, increasing appropriate consumer demand, and other prevention needs.

Although measles prompted the action, the immunization initiative is aimed also at eight other communicable childhood diseases—diphtheria, tetanus, pertussis or whooping cough, poliomyelitis, mumps, rubella, and Haemophilus influenza type b that causes bacterial meningitis, and hepatitis B.

Details are described of the immunization action plans developed by Dallas, TX; Maricopa County (Phoenix), AZ; South Dakota; Detroit, MI; San Diego, CA; and Philadelphia, PA, to ensure that children are fully immunized not just by the time they enter school but by age 2 years. The six were chosen by the Centers for Disease Control as representative of many without adequate childhood immunization coverage.

THE Department of Health and Human Services (HHS) through its Centers for Disease Control (CDC) has chosen six communities, representative of many without adequate childhood immunization coverage, to develop immunization plans as part of an across-the-nation effort to ensure that children are appropriately immunized not just by the time they enter school but by age 2 years. The six are Dallas, TX; Maricopa County (Phoenix), AZ; South Dakota; Detroit, MI; San Diego, CA; and Philadelphia, PA.

The "Immunization Action Plans" (IAP) are one of several Federal, State, and local responses to an outbreak of measles that produced 45,000 cases and more than 100 deaths in 1990.

President George Bush and the Secretary of HHS, Dr. Louis W. Sullivan, announced this ini-

tiative in a June 13, 1991, White House ceremony attended by leading public health officials, members of Congress, and immunization experts.

The effort focuses on breaking down barriers and providing better access to immunization in six representative localities "to solve the problem of late immunization."

President Bush noted that to solve the problem, "we've got to assault it from all angles and levels with public health efforts, with creative partnerships between (the public sector and) the nonprofit and the private sectors."

The six-community effort and subsequent early childhood immunization plans around the country are but one part of a much broader effort initiated by Secretary Sullivan as a Healthy People Year 2000 goal to increase immunization levels to at

Federal contract price and facilitate efficiencies in the distribution to Medicaid providers.

3. Assure that States and communities make full use of the opportunities presented through Medicaid and its child health component, the Early and Periodic Screening, Diagnostic, and Treatment (EPSDT) Program. EPSDT is required to provide immunizations appropriate to the child's age and health history.

4. Assure that health departments reach out to volunteer groups and community-based organizations to build grassroots support for adequate resources for immunization and to enhance local requests for immunization and to increase the priority of immunization. Intensify national and community-level efforts to build public awareness of the importance of preschool immunization and the efficacy and safety of vaccines.

Improving management of immunization delivery

5. Establish a formal set of minimum "Standards for Immunization Practice."

6. Establish an ongoing Interagency Coordinating Committee on Access to ensure high immunization levels for the clients served through their respective programs. Immunization coverage would be used by the Committee as one major indicator of the quality of services delivered. Periodic reports of the Committee's activities would be made to the Secretary of Health and Human Services and Congress.

7. Establish coordinated systems to support the determination of the immunization status of WIC (Special Supplemental Food Program for Women, Infants, and Children) and AFDC (Aid for Families with Dependent Children) recipients, particularly in urban areas. Incompletely immunized children would be referred for vaccination with appropriate followup or vaccinated on-site in WIC or AFDC clinics or offices. Assure that each immunized child is linked to a primary care system for acute and comprehensive care.

8. Assure Federal collaboration with major health care provider organizations to develop policies among their members to facilitate immunization delivery.

9. Assure that State and local governments have legislation mandating appropriate immunizations for children prior to enrollment in licensed day care centers.

Ongoing measurement of immunization status

10. Establish a national system for the annual

assessment of immunization coverage. Immunization coverage assessments would be required in all States, particularly for high-risk populations and in urban and rural areas.

Other measles prevention needs

11. Fully implement the two-dose measles immunization schedule and move toward implementing a uniform pediatric vaccination schedule.

12. Explore the establishment of a rotating fund for outbreak control so that funds for that purpose can be immediately available.

Need for new information

13. Conduct additional studies on operations and outcomes of immunization programs. Such studies will help in designing cost-effective measures to improve vaccine coverage; in understanding major barriers to full immunization among preschool children, particularly those in minority populations in inner cities; and in understanding cognitive barriers encountered by families of unimmunized children. Adequate information from laboratory and epidemiologic studies should be available to address the problems of vaccine-preventable diseases in highly vaccinated populations and diseases among young children.

Improve coordination with the private sector

14. Improve coordination and collaboration between the public and private sectors in the delivery of vaccines.

References

1. Public Health Service, Office of the Assistant Secretary for Health: Action plan to improve access to immunization services. National Vaccine Program Office, Interagency Committee to Improve Access to Immunization Services. U.S. Government Printing Office, Washington, DC, 1992.
2. Department of Health and Human Services, Office of the Secretary: Departmental program directions. Washington, DC, 1990.
3. Public Health Service, Office of the Assistant Secretary for Health: The measles epidemic: the problems, barriers and recommendations. National Vaccine Advisory Committee, Washington, DC, 1991.
4. Public Health Service, Office of the Assistant Secretary for Health: Healthy people 2000: national health promotion and disease prevention objectives. DHHS Publication No. (PHS) 91-50212. Office of Disease Prevention and Health Promotion. U.S. Government Printing Office, Washington, DC, 1990.

least 90 percent for the nation's children by their second birthday. These efforts also respond to 13 recommendations for improving immunization availability made by the National Vaccine Advisory Committee in January 1991. The recommendations focused on improvements in the management of immunization delivery and in methods for measuring immunization status, increasing appropriate consumer demand, and other prevention needs.

Although measles prompted the action, the immunization initiative is aimed also at eight other communicable childhood diseases—diphtheria, tetanus, pertussis or whooping cough, poliomyelitis, mumps, rubella, *Haemophilus influenza* that causes bacterial meningitis, and hepatitis B.

CDC technical experts in data systems management, program administration, evaluation, coalition building, and education provided assistance in the development of the six local plans and will continue to advise during implementation of the plans. The 63 immunization projects and remaining 19 urban areas within these projects will use the model developed during the six-area effort to guide their specific plans that will be submitted to CDC by July 17, 1992.

All six areas initially selected have now completed the planning process, and they have presented their Immunization Action Plans to Secretary Sullivan.

Dallas

The Dallas City and County plan emphasizes making immunization "user friendly" and includes provisions to

- provide services at convenient places and on evenings and weekends,
- relax strict appointment policies,
- use "express lane" clinic and mobile immunization teams,
- provide immunization in emergency rooms (where many low-income children get much of their care),
- reach parents when they are applying for Federal and State assistance, and
- expand the role of private medical providers in immunizing underserved children.

A total of 23 major objectives and 105 action steps to be taken over the next 8 years were agreed to by the planning participants. Altogether, 19 agencies accepted responsibility for implementing one or more action steps in the plan, and 58 organizations contributed to the planning process.

Maricopa County

The Maricopa County (Phoenix) plan—the second of the six plans developed—will make immunization more accessible by innovative solutions that will

- establish at least five additional mobile immunization clinics in areas of the county with the highest measles morbidity or areas where people lack access to immunization services;
- coordinate immunization delivery with Aid to Families with Dependent Children (AFDC) and Women, Infants, and Children (WIC) Programs in the area;
- use volunteer groups, such as the Kiwanis International, for education, outreach, and support; and
- establish reminder or recall systems in all public clinics.

The plan includes several other key partners within the Phoenix area, such as the Arizona Health Care Cost Containment System that is the Medicaid provider for the State, and the Ambulatory Care Clinics.

The Maricopa County plan was developed by the county health department in cooperation with a total of 43 other public and private sector agencies within the community. Once implemented, these activities will raise immunization coverage levels and, as a result, reduce the number of children who would otherwise suffer from vaccine-preventable disease.

South Dakota

The South Dakota early childhood immunization plan, using Rapid City as its model area, was the third plan to be unveiled and is the first statewide plan. It was developed by the South Dakota State Department of Health working in cooperation with other public and private sector agencies within the Rapid City community to address that community's 56 percent immunization rate for children younger than 2 years.

The South Dakota IAP will make immunization more accessible not only in Rapid City but also throughout the State. South Dakota is the first State to make a major contribution by doubling the reimbursement of physicians for immunizations to Medicaid-eligible children. The plan also contains commitments to

- make immunization services more readily accessible to AFDC enrollees,

'Besides the expansion of services, clinics will be made more "user friendly" by eliminating barriers such as appointment only systems and financial means testing.'

- establish screening and immunization services for pediatric patients prior to discharge from hospitals and emergency rooms statewide,
- facilitate the scheduling of immunization clinics at local county food stamp issuance offices so that they coincide with the dates when food stamps are issued,
- develop and implement a computerized system that will be capable of tracking the immunizations of Medicaid-eligible children,
- increase Medicaid reimbursement to private physicians and community health nurses for the administration of immunizations to Medicaid-eligible children,
- ensure that all children of all ages in the custody of the State are appropriately immunized,
- establish and maintain coordination of immunization activities with the Aberdeen Area Indian Health Service and the United Sioux Tribal Chairman's Health Board,
- develop and implement an information and education plan to promote age-appropriate immunizations at the community level,
- increase knowledge about the importance of immunizations in persons and agencies that provide care to preschool children, and
- propose that immunizations be given in the emergency rooms of the six Indian Health Service hospitals serving the nine largest population centers.

Detroit

A recent analysis of Detroit's population of 2-year-old children showed that only 57 percent of them had received the measles-mumps-rubella immunization, and only 31 percent had received all vaccines (4 DTP, 3 OPV, and 1 MMR) by their second birthday. The Detroit city-wide plan attempts to correct this situation by improving service delivery. It will, for example,

- establish new walk-in immunization clinics offering immunizations Monday through Friday for more than 4 hours a day;
- establish a rotating team composed of at least

one public health nurse and one clerk to extend the hours for immunization services from 4 to 8 at specific sites;

- establish a new immunization service in conjunction with the WIC supplemental food program;
- establish linkages between immunization activities and Detroit area maternal and infant outreach or maternal-child health programs;
- establish and provide free immunization services to children ages 0-4 years residing in or about Detroit's public housing projects;
- assess the immunization status and immunize the eligible pediatric in-patient population at Children's and Ford Hospitals; and
- establish information and education activities through the Infant Health Promotion Coalition that has links with 63 community-based organizations.

The City of Detroit proposes to implement a multilingual "Bring Your Record" campaign to stimulate parents of at-risk children to keep good records, keep appointments, and ensure that their children are fully immunized.

The campaign will include a variety of materials such as posters, billboards, transit cards, and pamphlets, and will be promoted simultaneously by primary care centers, WIC centers, evening clinics, private health care providers, Children's Hospital, and government agencies. Immunization information packets that are audience-appropriate would be distributed through existing outreach programs like Healthy Start, Latino Outreach Program, Operation Get Down, and a number of others.

San Diego County

In 1990, San Diego County reported 985 measles cases with at least three measles-associated deaths. The 1990 San Diego measles outbreak was among the largest in the country and accounted for 4 percent of all measles cases reported in the United States that year. Children less than 5 years of age accounted for 45 percent of all reported cases. It is estimated that 37 percent of the total cases occurred in Hispanics with measles incidence highest in Hispanics and African-Americans.

Although immunization completion rates by the second birthday are slightly higher in San Diego (48 percent) than either Dallas (city, 28 percent; county, 39 percent) or Detroit (31 percent), the levels are well below the established year 2000 goal.

More than 25 major health care agencies, many with multiple sites, committed in the plan to

adopting a comprehensive policy of "no barriers" to the delivery of immunization services. Approximately 48 organizations contributed to the planning process. In an unprecedented action, The Aetna Foundation provided \$50,000 to San Diego health officials to hire staff members to implement the plan and also donated health education resources and printing support for locally developed materials.

The plan consists of six program elements including service delivery, service linkages, community outreach and education, program management, and research. There are 37 objectives and 275 action steps planned to accomplish the 90-percent goal with an evaluation plan for each objective. Some of the significant aspects of the plan:

- San Diego County Health Services will double the number of immunization clinics held at satellite locations, provide a full-time, bilingual immunization team, and provide a mobile van to improve immunization services as funding becomes available.
- Governmental and community agencies are committed to obtaining support for legislation that requires youngsters entering family day care to be fully immunized and requires primary care insurance to reimburse the cost of childhood immunizations.
- WIC forms, statewide, will add immunization assessment information to screen all infants and young children enrolled in the program.
- The San Diego County Department of Social Services' welfare offices, as well as many community organizations, will provide space for on-site immunization services or coordinate with the county health department for referral.
- A major health maintenance organization, Southern California Kaiser Permanente, will establish special immunization clinics for nonmembers at all of its 17 sites.
- The University of California at San Diego Medical Center will institute a 5-day-a-week immunization service in its pediatric clinic and provide immunizations to preschoolers in its emergency room.
- Large and small regional employers have committed to developing and implementing an ongoing system to provide all employees with childhood immunization information.
- Pending available resources, a resource center is to be established within the county health services to provide language-appropriate materials to the county's many diverse cultures and to provide

consistent and current immunization materials targeting migrant workers, immigrants, pregnant and parenting teens, and parents of youngsters in child care facilities and schools.

- A community-based San Diego County advisory council with a broad base of expertise will be established to guide the implementation and ongoing activities outlined in the plan.

Philadelphia County

In 1991, Philadelphia reported 1,314 measles cases including at least eight measles-associated deaths. Philadelphia was the only city other than New York to report more than 1,000 measles cases in 1991. Excluding an explosive outbreak of at least 485 cases in a church group that opposes vaccination, children in the 0-5-years age group represented 6 percent of the total population but accounted for 61 percent of the measles cases. Only 17 percent of those eligible for vaccination had been vaccinated. Assessment data indicate that only 46 percent of Philadelphia children are completely immunized at age 24 months. Some of the more important contributions to the Philadelphia plan include commitments to

- increase public access to immunizations through expanded hours, including evenings and weekends, express lane service, and the removal of barriers such as "appointment only" systems;
- implement policy both to assess and appropriately immunize *all children* at clinics regardless of the primary reason for the visit;
- establish new and coordinated policies to increase immunization access in five major hospitals serving the children of the community;
- establish computerized reminder, recall, and tracking systems among all public providers and pediatric hospitals;
- assess immunization levels among clients served by different programs and among target population groups based on risk factors;
- endorse uniform standards for immunization practices in both the public and private health care sectors;
- provide on-site immunizations to homeless children 0-5 years of age in the 42 family shelters and boarding homes with a registry for all that are immunized;
- provide on-site immunizations to children ages 0-24 months of age residing in and around 32 public housing developments; and
- pursue outreach and education through com-

munity-based organizations which will focus on the development of educational materials, professional education, and a mass media campaign to maintain public awareness.

National Initiative

The strategy to develop Immunization Action Plans at the local level is closely coordinated with efforts at the national level by the Interagency Committee to Improve Access to Immunization Services. The Federal immunization budget has more than tripled in the past 4 years, growing from \$98.2 million in fiscal year 1988 to \$297 million in fiscal 1992.

In 1992, for the first time, the Federal Government is adding \$46 million to improve immunization delivery to preschool children. This will allow local public health care providers to add more clinics, hours and staff. Each of the immunization projects will be eligible for these funds based on the quality and merit of their plans.

The plans developed in the six areas will serve as examples for plan development nationwide. Each plan represents a broad based comprehensive effort to address a serious problem that can be solved. Specific commitments are made by health care providers in the public and private sectors as well as government, business, volunteer, and community organizations.

Each plan is unique and innovative, reflecting different problems in different parts of the country. Yet there are more similarities than differences in the plans. Besides the expansion of services, clinics will be made more "user friendly" by eliminating barriers such as appointment only systems and financial means testing. The failure to vaccinate young children, often referred to as "missed opportunities," will be reduced through the adoption of immunization practice standards and improved education.

Assessment of the true immunization levels among different population groups and among infants and young children served by different programs will be made. Information and education strategies are included in each plan with emphasis on culturally sensitive and linguistically appropriate materials that give consideration to reading levels.

Community outreach is evident through the establishment of mobile services in high morbidity or medically underserved areas or both and through the involvement of community and neighborhood organizations.

The development of Immunization Action Plans in all States, designed to raise immunization levels incrementally each year, gives significant impetus to the national goal to immunize fully at least 90 percent of the nation's children by their second birthday by the year 2000.

The Measles Epidemic

The Problems, Barriers, and Recommendations

The National Vaccine Advisory Committee

The nation has experienced a marked increase in measles cases during 1989 and 1990. Almost one half of all cases have occurred in unvaccinated preschool children, mostly minorities. The principal cause for the epidemic is failure to provide vaccine to vulnerable children on schedule. Major reasons for the low vaccine coverage exist within the health care system itself, which creates barriers to obtaining immunization and fails to take advantage of many opportunities to provide vaccines to children. Ideally, immunizations should be given as part of a comprehensive child health care program. However, immunization cannot await the development of such an ideal system. Essential changes can and should be made now. Specific recommendations include improved availability of immunization; improved management of immunization services; improved capacity to measure childhood immunization status; implementation of the two-dose measles vaccine strategy; and laboratory, epidemiologic, and operational studies to further define the determinants of decreased vaccine coverage and to develop new combinations of vaccines that can be administered earlier in life. The measles epidemic may be a warning flag of problems with our system of primary health care.

(JAMA. 1991;266:1547-1552)

REMARKABLE progress has been made in the effort to control measles since 1963 when measles vaccines became available for use (Fig 1). However, during the past 2 years, measles cases and deaths have risen sharply. During 1989, more than 18 000 cases and 41 deaths were reported, the largest number of reported cases since 1978 and the largest number of deaths in almost two decades.¹ The epidemic intensified during 1990—with more than 25 000 cases and more than 60 deaths.¹

The current epidemic has hit the nation's youngest and most vulnerable children hardest. The recent increase in cases has been greatest among children younger than 5 years of age (Fig 2).¹

During 1989, outbreaks among preschool children predominated with three inner-city epidemics (Chicago, Ill, Houston, Tex, and Los Angeles, Calif) accounting for one third of all cases. This trend accelerated during 1990, with nearly half of all cases occurring among children less than 5 years of age (Fig 2).¹ Minority children are disproportionately affected with Hispanic and

black preschool children, particularly in urban areas, facing seven to nine times the risk of contracting measles as white children.¹

This represents a change from the mid 1980s when most measles cases occurred among a small proportion of

school- and college-age students who had not been vaccinated or who had been vaccinated unsuccessfully. Because vaccine failure remains a problem, beginning in 1989, a second dose of vaccine was recommended to be administered at the time of enrollment in either primary school or middle or junior high school.^{2,3} Since this is a long-term solution requiring 7 to 13 years to reap the full benefits, aggressive revaccination during school-based outbreaks will be needed in the interim.

Studies reveal no change in the effectiveness of the vaccine during recent years (G. E. King, MD, unpublished data, 1991). The vaccine, licensed and in use since 1963, protects about 95% of those who receive it. About three fourths of those with measles during 1990 were unvaccinated (Fig 3).¹ For this unvaccinated group of children, more than 17 000 cases could easily have been prevented with the currently available, highly safe and effective vaccine.

The principal cause for the measles epidemic is failure to provide vaccine to

THE NATIONAL VACCINE ADVISORY COMMITTEE

The National Vaccine Program was established in 1986 by the Public Health Service Act to achieve optimal prevention of infectious diseases through immunization and optimal prevention of adverse reactions to vaccines. The program is responsible for coordination and direction of government and nongovernment activities on research, licensing, production, distribution, and use of vaccines. The director is the assistant secretary for health, with the National Vaccine Advisory Committee serving as advisor. The committee consists of 15 voting members appointed by the director, in consultation with the National Academy of Sciences, including individuals in vaccine research or manufacture, physicians, members of parent organizations, and representatives of health agencies and public health organizations. The committee also includes five nonvoting members from the National Institutes of Health, the Food and Drug Administration, the Centers for Disease Control, the Agency for International Development, and the Department of Defense. (This committee report has been submitted to the assistant secretary of the Department of Health and Human Services.)

Members of the National Vaccine Advisory Committee who have authorship responsibility for this article are listed below.

Donald A. Henderson, MD, MPH (Chair), The Johns Hopkins University, Baltimore, Md; Frances J. Dunston, MD, New Jersey Department of Health, Trenton; David S. Fedson, MD, University of Virginia Medical Center, Charlottesville; Vincent A. Fulginiti, MD, Tulane University, New Orleans, La; Robert John Gerety, MD, Biogen Inc, Cambridge, Mass; Fernando A. Guerra, MD, San Antonio (Tex) Metropolitan Health District; Kay Johnson, Children's Defense Fund, Washington, DC; Edgar K. Marcuse, MD, University of Washington, Seattle; Don P. Metzgar, PhD, Connaught Laboratories Ltd, Willowdale, Ontario; Ronald J. Saldarini, PhD, Lederle-Praxis Biologicals, Wayne, NJ; Parker A. Small, Jr, MD, University of Florida, Gainesville; Gene H. Stollerman, MD, Edith Nourse Rogers Memorial Veterans Hospital, Bedford, Mass; Thomas M. Vernon, MD, Colorado Department of Health, Denver; Catherine Wilfert, MD, Duke University Medical Center, Durham, NC.

Reprint requests to National Vaccine Program Office, Parklawn Bldg, Room 13A-53, 5600 Fishers Ln, Rockville, MD 20857 (Dr Kenneth J. Bart).

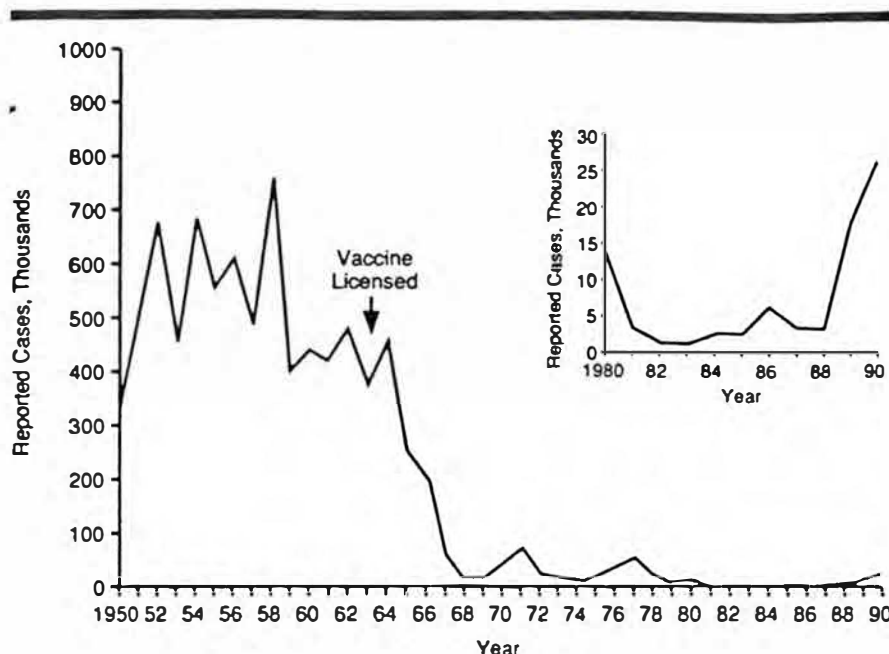


Fig 1.—Reported number of measles cases in the United States by year, 1950 through 1990. (Data from the Centers for Disease Control¹; unpublished 1990 provisional data also supplied by the Centers for Disease Control, Atlanta, Ga.)

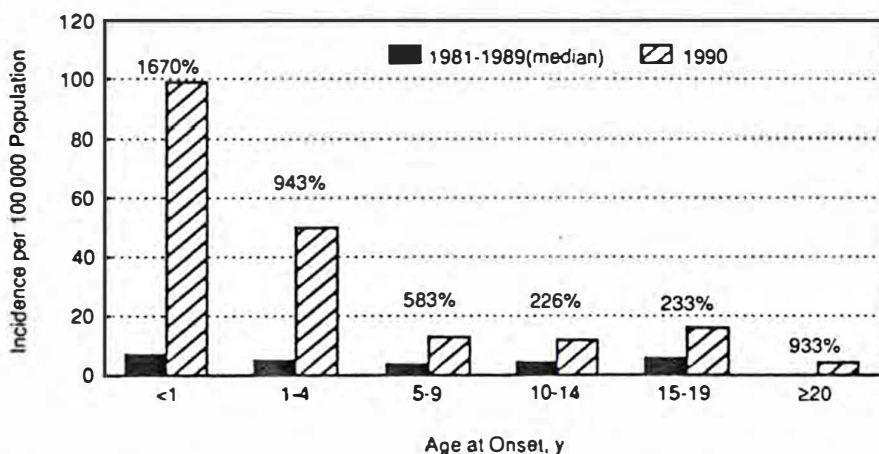


Fig 2.—Age-specific measles incidence (percent increase) in the United States, 1981 through 1989 and 1990. (All data, including unpublished 1990 provisional data through week 52, provided by the Centers for Disease Control, Atlanta, Ga.)

children at the recommended age.⁴⁴ Although immunization levels are 97% to 98% at the time of enrollment in school, they are reported to be as low as 50% among 2-year-old children in some inner-city populations.⁴⁴ As a result, these vulnerable children remain susceptible, and a highly contagious disease such as measles spreads rapidly and widely. Limited data suggest that the problem in inner cities is not uniform and that some inner cities have achieved immunization coverage high enough to prevent significant transmission of measles.⁴

The measles epidemic is cause for serious concern. But measles, being the most contagious of the vaccine-preventable diseases,⁴ is also an indicator that signals a failure in the system of vaccination. Given low immunization levels among young children, it is reasonable to suspect that there are substantial numbers of children now also susceptible to pertussis, poliomyelitis, mumps, and rubella. Likewise, *Haemophilus* disease, which is now preventable by vaccination, continues to be a serious problem (oral communication, S. L. Cochi, MD, 1991).

THE NATION'S CHILDHOOD IMMUNIZATION SYSTEM

The current childhood immunization system in the United States is a patchwork of public and private sector efforts that include participation of private physicians and local, state, and federal governments.⁴ The vaccination system consists of two major components: (1) vaccine purchase and (2) vaccine administration to children. Half of all vaccines are administered in the private sector and half are administered in the public sector.

Since 1963, the federal government, through the Centers for Disease Control (CDC), in Atlanta, Ga, has provided grants to states and some large county and city health departments to assist with the purchase of adequate supplies of vaccines and to supplement their immunization efforts. Federal immunization grants currently support purchase of approximately half of the total public sector vaccine needs, although the proportion varies by specific vaccine. State and local resources are used to meet the remaining vaccine needs. Federal immunization grants also support administrative activities such as assessment of immunization coverage, promotion of vaccination, and surveillance of disease and adverse events.

Actual provision of vaccines in the public sector is primarily a state and local responsibility, although federal funds provide support for provision through Medicaid, the Maternal and Child Health block grants, the Prevention block grants to states and designated localities, and as federal grants directly to community health centers. Although the total federal resources being provided for immunization are considerable, there is presently no formal national coordination of the federal role in vaccine provision.

It is not possible to determine precisely how much money is used for immunization. It is clear, however, from available evidence that publicly funded clinics are essential as a source of preventive care for low-income families and that many clinics lack the resources to adequately serve all families in need of low-cost or free immunizations.⁴

WHY ARE CHILDREN NOT BEING VACCINATED?

The current system of vaccination is complex and varies from city to city and state to state. There is no universal approach to reach all children. Known barriers to successful immunization for all children include four key types,⁴ including (1) missed opportunities for administering vaccines; (2) shortfalls in the

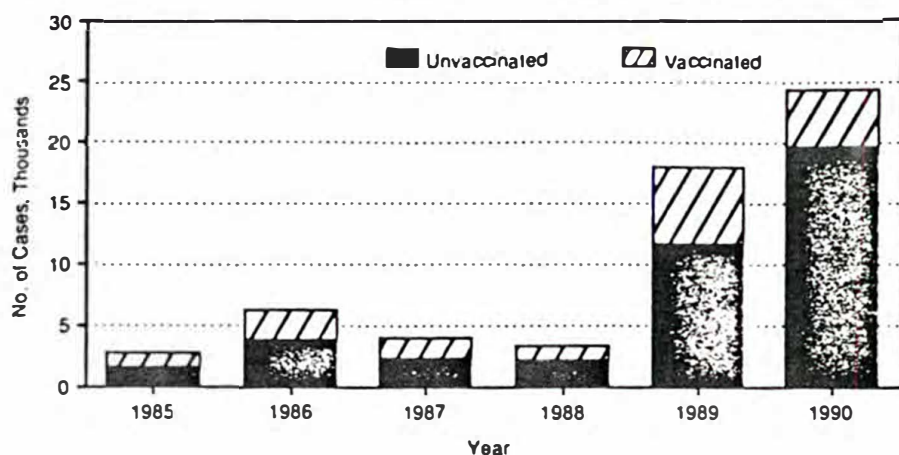


Fig 3.—Number of measles cases in vaccinated vs unvaccinated persons, 1985 through 1990. (Unpublished data provided by the Centers for Disease Control, Atlanta, Ga.)

Table 1.—Percentage of Measles Cases Occurring in Unvaccinated Children Who Were Enrolled in Low-Income Assistance Programs and Were Eligible for Measles Vaccination*

Program Type	Dallas (n = 160)	Milwaukee (n = 128)	Chicago (n = 71)	Los Angeles (n = 38)	New York (n = 40)
WIC	25	54	61	57	50
AFDC	19	86	---	60	63
Food stamps	31	---	---	51	53
Medicaid	22	---	---	45	75
Public housing	12	26	---	3	25
Any program	40	91	61	71	78

*WIC indicates Supplemental Food Program for Women, Infants, and Children; and AFDC, Aid to Families With Dependent Children. (Unpublished data from the Centers for Disease Control, Atlanta, Ga.)

health care delivery system with barriers to immunization; (3) inadequate access to care; and (4) incomplete public awareness of and lack of public request for immunization. Each can be addressed.

Missed Opportunities to Vaccinate Children

Parents are often blamed for the poor immunization status of their children, but the evidence suggests that the health care system must assume substantial responsibility for failure to vaccinate.⁹ Many opportunities to provide needed vaccines are missed. Two types of missed opportunities are of particular importance: (1) a child brought to a center for immunization is not vaccinated because of inappropriate contraindications such as minor illness, or only one or two vaccines are given when, in fact, others are also needed and should be given; and (2) a child in need of vaccination has contact with a health care provider for other reasons, but his or her immunization status is not assessed and immunizations are not offered.

Studies of unvaccinated measles patients in some epidemics have shown

that about one third of these children had one or more visits at which an opportunity was missed for vaccination⁹ (K. M. Farizo, MD, unpublished data, 1991). Failure to vaccinate children in emergency departments and acute care clinics is particularly important because many inner-city children use such settings as a primary source of care.¹⁰ National survey statistics for 1988 reveal that infants in inner-city areas were twice as likely as suburban or rural infants to be brought to such clinics (including hospital outpatient clinics, other clinics and health centers, or emergency departments). Nearly half of all black or Hispanic infants received routine care in a clinic setting.¹¹

Although inner-city preschool children are often described as hard to reach, many of these children are in regular contact with public assistance programs that typically see enrolled families every month. Opportunities exist through these programs to screen for immunization and, where practical, vaccinate children on-site. This is infrequently done, however, as each of the programs is administered by different agencies. Recent investigations of in-

ner-city measles outbreaks in Chicago, Dallas, Tex, Los Angeles, Milwaukee, Wis, and New York, NY, indicate that 40% to 91% of unvaccinated preschool children who developed measles were enrolled in one or more public assistance programs, most commonly Aid to Families With Dependent Children (AFDC) (and consequently Medicaid), as well as the Supplemental Food Program for Women, Infants, and Children (WIC) (Table 1)⁹ (CDC, unpublished data, 1991).

The failure to adequately vaccinate many children currently enrolled in public assistance programs suggests that many of the potential benefits gained by recent expansions in Medicaid eligibility to a much larger group of poor and near-poor preschoolers may not be realized unless steps are taken to assure that immunization is an integral part of program activities. Nearly one of every three children younger than 6 years of age—more than 6 million children in all—can now be covered by Medicaid if their families apply for medical assistance.

The lack of national coordination of vaccine provision has led to fragmentation in policies and absence of centralized monitoring of the impact of each federal program involved with immunization. Policies that maximize opportunities for vaccination at each clinic visit may not be receiving the priority that is required because of the absence of strong national coordination. Recognizing this need, the secretary of Health and Human Services has recently promulgated nine strategic program directions, two of which use immunization as an indicator of success: (1) to improve the health and well-being of individuals through improved preventive health care, which includes examining the potential of expanding Medicaid coverage for immunization, and (2) to improve access of young children and their families living in poverty to a wide array of developmental and support services, including health.

To improve integration of efforts to enhance immunization, the Interagency Coordinating Group to Improve Access to Immunization comprising all agencies involved in vaccine provision or serving high-risk populations has recently been formed. The group includes various Department of Health and Human Services agencies and the Departments of Agriculture, Housing and Urban Development, and Education.

Shortfalls in the Delivery System: Barriers to Immunization

The CDC surveyed immunization program managers from 54 of the 57

Table 2.—Prices for Vaccines Purchased Through the Federal Government Contract vs Representative Catalog Prices*

Vaccines	Contract Price, \$†	Catalog Price, \$†
Diphtheria-tetanus-pertussis vaccine	6.25	9.97
Haemophilus b conjugate vaccine (HbOC)‡	5.16	14.55
(PRP-OMP)§	8.25	16.00
Measles-mumps-rubella vaccine	15.33	25.29
Oral polio virus vaccine	2.00	9.45

*As of June 30, 1991. (Unpublished data from the Centers for Disease Control, Atlanta, Ga.)

†Price per dose.

‡Diphtheria CRM₁₁₉ Protein Conjugate (HbOC), manufactured by Lederle-Praxis Biologicals, Inc. Wayne, NJ.

§Meningococcal Group B Outer Membrane Protein Conjugate (PRP-OMP), manufactured by Merck Sharp and Dohme, West Point, Pa.

largest immunization projects in May 1990 to identify barriers leading to low immunization levels among preschool children.⁹ Only two states reported inadequate vaccine supplies in the public sector for routine immunization of preschoolers, despite the prevalent belief that this was a major problem. These difficulties were subsequently resolved.

The major unsolved problems identified in this survey were obstacles to vaccination. Of the 54 immunization program managers surveyed, half cited resource and/or policy barriers that limited access to vaccinations in one or more communities in their project areas. Policy barriers for these 27 projects included the following: immunizations being available by appointment only, 93%; requirements for physical examination prior to immunization, 56%; need for physician referral in order to be vaccinated, 41%; requirements for enrollment in well-baby clinics in order to be immunized, 37%; and administration fees, 22%. State and local resource problems that were cited included the following: insufficient clinic personnel, 70%; inadequate clinic hours, 56%; and too few clinic locations, 15%.

National survey data of Hispanic families report inconvenient clinic hours and locations as leading barriers to care.¹⁰ Other reported problems include cultural and language barriers between local clinic personnel and some of the populations they serve, compounded by inappropriate health educational materials. In brief, many immunization settings are simply not user-friendly.

In addition, many public sector clinics have inefficient immunization record-keeping systems that do not allow programs to track or notify families routinely when vaccinations are due. Computerized systems that would facilitate rapid assessment of immunization and outreach are often absent.

Problems in the public sector are compounded by difficulties in vaccinating children in the private sector. The high costs of vaccines to private physicians are often passed on to parents (Table 2) because the majority of insurers fail to cover vaccination.¹¹ A survey conducted in 1989 by the Health Insurance Association of America indicated that between 45% and 98% of children were covered for the basic childhood vaccination series depending on the type of insurance plan. The employment-based plan with conventional health insurance covered 45%; preferred-provider plans, 62%; and health maintenance organizations, 98%.¹² This plus concerns about liability has led some physicians to discontinue immunization as an office-based service.¹³ (The recently established National Vaccine Injury Compensation Program should alleviate this problem.) This set of circumstances leads in turn to greater fragmentation of care as private sector patients are forced to seek immunizations in already overtaxed public clinics.

Inadequate Access to Care

Because many families have no ongoing relationship with a health care provider, low immunization rates reflect, in part, inadequate access to care. National survey statistics¹⁴ show that preschool children from more affluent families (family incomes above \$35 000) were far more likely to have had a routine health care visit, including prevention services, than were those children from families with incomes below \$10 000. In 1988, black infants were two to three times more likely than white infants to have had no well-baby care or visits.

Inadequate Public Awareness and Lack of Public Demand for Immunizations

In some communities, the low demand for immunization and a limited appreciation of the importance of beginning immunization in infancy has been reported among parents who may be isolated from the health care system.¹⁵ Low demand for immunization by such parents further reduces immunization coverage levels.

VOLUNTEER PARTICIPATION IN IMMUNIZATION EFFORTS

Many parents of inner-city preschool children, particularly those from minority groups, lack information about the importance of immunizing their children at the recommended ages.¹⁶ Public sector agencies such as health departments often lack the resources and expertise to develop, produce, and dis-

seminate culturally sensitive and linguistically appropriate educational materials. Volunteer organizations and other private sector groups can play a major role in assisting health departments in effectively getting the immunization message out. In addition, they can help build local support for the resources needed to enhance the immunization services in their respective communities. Volunteer groups can also help improve clinic efficiency by providing additional clerical and nursing support to existing clinics.

To increase immunization levels rapidly, some cities, with the assistance of volunteer groups, have attempted campaigns where vaccines are offered in multiple sites outside of routine clinics usually over a 1- to 2-day period. To date, such approaches have generally proved disappointing with only small proportions of the estimated target populations vaccinated. Moreover, such campaigns do not build the permanent improvements in the vaccine delivery system essential to sustain the high coverage levels required to provide present and future vaccines. While vaccination campaign approaches may still be explored, volunteer efforts are more likely to be productive if targeted toward permanent improvements in vaccine provision and appropriate recordkeeping.

STUDIES

Activities that could be expected to have a marked impact in reducing measles cases include studies to develop vaccines that are safe and effective at younger ages; studies to ensure that the current vaccine continues to be effective; and studies to design cost-effective ways to reach more children with available vaccine in and out of the comprehensive health care system.

COMMENT

The major reason for the resurgence of measles is failure to administer vaccines to children at the appropriate age. Studies are under way by the CDC and others to better assess the role of consumer education and motivation, provider practices, and local agency policies in contributing to low immunization coverage. As these data become available, strategies for vaccine provision can be refined. Available information, however, indicates that the major cause can be found in the health care delivery system itself.

Parents who seek immunization for their children face many obstacles. One barrier results from policies that make immunization difficult to obtain, such as the need to schedule appointments, enroll the child in a well-child care pro-

gram, or have a prior physical examination that is not immediately possible. Other barriers to immunization are inadequate numbers of clinic personnel to provide vaccination and the scheduling of clinics at inconvenient hours. Immunization services should be provided at all times during weekday working hours and at times when working parents can bring their children for services, such as evenings and weekends. Providing adequate personnel to accomplish these goals is difficult for large urban health departments in particular, most of which have severe fiscal constraints caused by eroding tax bases and increasing service demand. In addition, many opportunities to vaccinate children who interact with the health care system are missed. Finally, little effort has been made to enhance access of the disadvantaged to immunization services through other public assistance programs.

Immunization benefits not only the child who is vaccinated but society as a whole. The vaccine-preventable diseases are contagious, and outbreaks among inner-city infants and toddlers threaten not only their health but the health of all susceptible children and adults, whether they live in urban, suburban, or rural areas. Because disease in any part of this country is a threat to all, federal, state, and local governments share responsibility for improving deficient delivery systems.

Ideally, immunizations should be given as one part of a comprehensive child health care program. This is the ultimate goal toward which the nation must strive if all of America's children are to benefit from the best our health care system has to offer. The lack of adequate resources represents a principal barrier. However, the provision of immunization, our most cost-effective health service, cannot await the development of the ideal comprehensive child health system. Essential changes in the childhood immunization system can and should be made now.

RECOMMENDATIONS

Improve Availability of Immunization

1. Additional federal financial support should be provided through immunization grants to state and local health departments to enhance the vaccine delivery infrastructure (eg, professional staff and community outreach workers). These funds should be distributed to areas most in need, particularly large cities. New policies should assure that resources are used to improve current immunization provision rather than to substitute for current state and local

efforts.

2. Vigorous efforts should be made, including legislation if necessary, to assure that insurers provide or reimburse for immunization as part of their basic health benefits package and that all managed health care systems, including health maintenance organizations, provide routine vaccination services.

3. Medicaid, and its child health component, the Early and Periodic Screening, Diagnosis, and Treatment (EPSDT) program, should be integrally involved in tracking children in need of immunizations and providing adequate reimbursement for the service. Thus, Medicaid should assess immunization levels of clients served by individual providers as a measure of quality and to assure compliance with federal EPSDT requirements. Medicaid providers should either be given vaccine through the public sector or be adequately reimbursed for the cost of purchasing vaccine and its administration. To reduce these costs, vaccine used by Medicaid providers should be purchased at low federal contract prices.

State EPSDT programs should better comply with federal guidance to make aggressive efforts to enroll families; recruit and retain health care providers; provide appointment scheduling and transportation assistance; and establish a recommended well-child visit schedule that follows the guidelines of the American Academy of Pediatrics.

4. Health departments should reach out to volunteer groups and community-based organizations to build grass roots support for adequate resources for immunization and to enhance local request for, and prioritization of, immunization. The current national and community-level efforts to build public awareness of the importance of preschool immunization and the efficacy of vaccines and their safety should be intensified.

Improve Management of the Provision of Immunization

5. The National Vaccine Advisory Committee should issue a formal set of minimum standards for immunization practice in collaboration with the Interagency Coordinating Group (see recommendation 6) and private sector groups (see recommendation 8) for the provision of vaccine.

The minimum standards of immunization practice for all public sector clinics should include the following: (1) immunizations should be available on request without required appointments; (2) immunizations should be given to all children who have no known contraindications and appear to be in good health

without requiring routine physical examinations or measuring temperatures; (3) each clinic should have a prominently posted list of valid contraindications, and all providers should be familiar with valid contraindications; (4) accepted procedures for informing parents or legal representatives regarding benefits, risks, and contraindications of vaccination should be followed in all instances; (5) simultaneous administration of all needed vaccines should be the norm; (6) adequate staff must be available to provide needed immunization services during routine working hours and, where needed, at times more convenient to parents such as evenings and weekends.

6. The Interagency Coordinating Group to Improve Access to Immunization, chaired by the National Vaccine Program, should develop and implement a coordinated plan to ensure high immunization levels for the clients they serve. Immunization coverage should be used as one major indicator of the quality of services provided. Periodic reports of the group's activities should be made to the National Vaccine Advisory Committee. Appropriate interagency coordinating groups should also be formed at regional and state levels.

7. Federal participation is needed to support determination of immunization status of WIC and AFDC recipients, particularly in urban areas. Children with incomplete immunization should either be referred for vaccination with appropriate follow-up or be vaccinated on-site in WIC or AFDC clinics and offices. Projects that evaluate the feasibility, effectiveness, and cost-effectiveness of approaches toward improving immunization coverage in these populations should be encouraged, including conjoined location of WIC, AFDC, and immunization services ("one-stop shopping"). Results of successful efforts should be brought to the attention of all interested groups.

8. The National Vaccine Program should assure collaboration through the CDC with major health care provider organizations including the American Academy of Pediatrics, the American Medical Association, the American Academy of Family Physicians, and other key physician and nursing organizations to develop policies among their members to facilitate the provision of immunization. These groups should participate in developing minimum standards for immunization practice and a checklist of valid contraindications for vaccination. Organization endorsements should be sought especially for provision of immunizations outside of comprehensive care settings when

such care is either not available or difficult to obtain, particularly in acute care settings, and to encourage members to take advantage of all opportunities.

9. State and/or local governments that have not as yet done so should enact legislation to mandate appropriate immunization prior to enrollment in licensed day-care centers.

Ongoing Measurement of the Children's Immunization Status

10. National immunization coverage should be assessed annually through the National Health Interview Survey. Immunization coverage assessments are also required in all states and should be conducted in high-risk urban and rural local areas. The CDC should explore feasible and economical ways of measuring immunization coverage of 2-year-old children at state and local levels. Federal resources should be used to enhance surveillance, particularly in high-risk inner-city areas, in order to obtain better information on vaccine-preventable diseases and so design the most appropriate control strategies.

Other Measles Prevention Needs

11. The two-dose schedule, recommended as measles-mumps-rubella vaccine, should be fully implemented across the country. Some cases of measles will occur in schools and colleges as long as students have not received a second dose of vaccine. In most areas, two age groups are being vaccinated each year—one school-age group (either entrants to primary school or entrants to middle or junior high school) and college entrants. The 1991 congressional appropriation allocated immunization grant funds to purchase approximately one half of the needed measles-mumps-rubella vaccine provided in the public sector. Additional funds should be provided as required.

12. A rotating fund should be established for outbreak control so that funds

would always be immediately available. This would eliminate the need to wait for emergency appropriations before responding to an outbreak. Because the two-dose schedule is a long-term solution and its full impact will not be achieved for perhaps 7 to 13 years, funds will be needed in the meantime for revaccination during outbreak control.

Need for New Information

13. Optimal measles prevention requires greater knowledge about how best to provide vaccine and more information on measles virus, measles disease, and measles vaccines.

More studies on immunization program operations and outcomes should be conducted to help in designing the most cost-effective measures to improve vaccine coverage and to better understand the key barriers to full immunization among preschool children, particularly minority populations living in inner cities. Innovations, ranging from small changes such as provision of vaccine on an "express lane," walk-in basis, to the use of birth certificate information for tracking of infants by computer, and better coordination of public programs should be tested for their ability to increase immunization coverage.

Laboratory and epidemiologic studies should be conducted to address both the problem of measles in highly vaccinated populations and of measles in young children. Such studies should include the following: (1) development of techniques to rapidly diagnose measles and to effectively measure protective immunity; (2) studies of disease and vaccine strains to ensure that existing vaccines continue to provide a high degree of protection against circulating wild-type measles; (3) studies on the response to a second dose of measles vaccine provided at various ages and intervals, and other investigations to determine whether implementation of the two-dose schedule will eliminate

measles in school-age populations; and (4) studies to develop vaccines capable of providing long-lasting protection when given to children 6 to 12 months of age or younger.

Infants younger than 12 months of age accounted for about one of every eight cases reported in 1989 and 1990, and 30% of all cases in preschool children. Currently, the age of measles vaccination is often lowered from 15 to 12 months in cities at risk of preschool measles and to 6 months during large outbreaks. However, vaccination at 6 months of age is less effective, due to interference by maternal antibodies remaining in the infant's system, and necessitates revaccination at 15 months of age. The availability of measles vaccines that more reliably protect children under 12 months of age would allow more effective control of measles.

Many of the above recommendations can and should be implemented without the need for new resources. For example, some policy changes can be executed with existing funds and may have substantial impact. Some recommendations such as having Medicaid assure that vaccines are purchased from low-cost federal contracts should actually be cost-saving. Nevertheless, some recommendations will require new resources. To enhance the vaccine delivery infrastructure, inner cities without a sufficient supply of nurses will need funds to hire them. New staff will be needed to assess vaccination in WIC clinics and AFDC offices. Funds will be needed to address some of the key information needs. Accurate resource estimates for implementing the above recommendations will need to be developed. Based on a partial examination of available information, the National Vaccine Advisory Committee estimates that implementation of all of the recommendations will require a net increase of immunization funds by \$40 million to \$50 million annually.

References

- Centers for Disease Control. Measles—United States, 1990. *MMWR*. 1991;40:369-372.
- Centers for Disease Control. Measles prevention: recommendation of the Immunization Practices Advisory Committee (ACIP). *MMWR*. 1989;38:1-18.
- American Academy of Pediatrics Committee on Infectious Diseases. Measles: reassessment of the current immunization policy. *Pediatrics*. 1989;84:1110-1113.
- Centers for Disease Control. Update: measles outbreak—Chicago, 1989. *MMWR*. 1990;39:317-319, 325-326.
- Centers for Disease Control. Measles vaccination levels among related groups of preschool-aged children—United States. *MMWR*. 1991;40:36-39.
- Orenstein WA, Bernier RH. Surveillance: information for action. *Pediatr Clin North Am*. 1990;37:709-734.
- Anderson RM, May RM. Immunisation and herd immunity. *Lancet*. 1990;335:641-645.
- Orenstein WA, Atkinson W, Mason D, Bernier RH. Barriers to vaccinating preschool children. *J Health Care Poor Underserved*. 1990;1:315-330.
- Hutchins SS, Escalan J, Markowitz LE, et al. Measles outbreak among unvaccinated preschool-aged children: opportunities missed by health care providers to administer measles vaccine. *Pediatrics*. 1989;83:369-374.
- Wood DL, Hayward RA, Corey CR, Freeman HE, Shapiro MF. Access to medical care for children and adolescents in the United States. *Pediatrics*. 1990;86:666-673.
- National Center for Health Statistics. *Health insurance and medical care: health of our nation's children, United States, 1988*. Hyattsville, Md: Advanced data 188, 1990.
- Estrada A, Trevino F, Ray L. Health care utilization barriers among Mexican Americans: evidence from HHANES, 1982-1984. *Am J Public Health*. 1990;80(suppl):27-31.
- Health Insurance Association of America. *Research Bulletin: A Profile of Employer-Sponsored Group Health Insurance*. Washington, DC: Health Insurance Association of America; 1989.
- Schulte JM, Brown GR, Zelman MR, et al. Changing immunization referral patterns among pediatricians and family practice physicians, Dallas County, Texas, 1988. *Pediatrics*. 1991;87:204-207.
- Freimuth VS, Mettger W. Is there a hard-to-reach audience? *Public Health Rep*. 1990;105:232-238.
- Lewis T, Osborn LM, Lewis K, Brockert J, Jacobsen J, Cherry JD. Influence of parental knowledge and opinions on 12-month diphtheria, tetanus, and pertussis vaccination rates. *AJDC*. 1988;142:283-286.

Focus On

The First Sixty Months

*THE
"Rochester
Plan"*

A Handbook of Promising Prevention Programs for Children Zero to Five Years of Age

A Joint Product of the National Governors' Association
Committee on Human Resources

and

Center for Policy Research

July 1987

Courtesy NGA/Amico



The Prenatal/Early Infancy Project

THE ROOTS OF MANY PREVENTABLE EARLY CHILDHOOD PROBLEMS — ABUSE AND NEGLECT, LOW BIRTHWEIGHT, IMPAIRED DEVELOPMENT — MAY OFTEN BE TRACED TO A LACK OF CARE DURING AND IMMEDIATELY FOLLOWING PREGNANCY. CAN AN IMPROVED DELIVERY SYSTEM FOR PRENATAL AND EARLY INFANCY CARE MAKE A DIFFERENCE?

The Program

A research project at the University of Rochester tested the effectiveness of a multi-faceted prevention program for high-risk families featuring home visitation by nurses. Known as the Prenatal/Early Infancy Project, it was tested in a semi-rural area in the Appalachian region of New York. Services were made available to anyone in the community bearing a first infant, but the program focused specifically on families possessing certain risk characteristics, such as those in which the mother was unmarried, poor, or a teenager. Of the families involved in the project over a ten-year period, 85 percent had these characteristics. The children in these families were considered at high risk because of the obstacles their parents faced in seeking and taking advantage of the information and services needed to prevent childhood disorders such as premature birth, low birthweight, growth and nutritional problems, accidents, illnesses, developmental delays, behavior problems, and child maltreatment. The overriding concern of the program was to promote the health and development of children through the family and the community.

Parents were considered the most important influence for the good health and development of children. The project addressed specific parental behaviors that affect fetal and infant health and development. The nurses involved with the families engaged in three basic activities designed to improve conditions

for pregnancy, birth, and early childrearing including:

- providing parents with a home-based education program to promote positive health and caregiving behaviors;
- involving friends and relatives whom the families wanted at the home-visits to create a more supportive atmosphere for the bearing and rearing of children; and
- linking the families with other community services so that the families' basic needs could be met.

The design of the program had participating families randomly assigned to one of four treatment groups. Each group received a different increment of services so the efficacy of a service could be measured. As part of the research design:

- Group 1 families served as a control. When the children were one year and two years of age, they were screened for health and development problems. No services, however, had been offered during pregnancy.
- Group 2 families received the above screenings and were offered free transportation to regular prenatal services.
- Group 3 families were provided a nurse home-visitor during pregnancy in addition to the transportation services and post-birth screening.

- Group 4 families received all the Group 3 services, and the nurses continued to make home-visits until the babies were two-years-old.

The Results

The four treatment groups can be pared down to just two, those who received nurse home-visits and those who did not, because free transportation made little difference in the families' use of prenatal services. Group 3 and Group 4 families showed a significant improvement in several areas related to child health and development. Nurse-visited mothers:

- smoked fewer cigarettes during pregnancy;
- improved the quality of their diets;
- delivered fewer children prematurely; and
- made better use of community support services.

Nurse visited children were:

- delivered with higher birthweights;
- punished less;
- seen less frequently in the hospital emergency room; and
- reported abused and neglected fewer times.

The Prenatal/Early Infancy Project has shown that the social and health environments for childbearing among the socially disadvantaged can be improved. The results suggest that the nurse home-visitors system can improve a family's use of community services, reliance on informal social support, and adherence to positive health habits.

In 1987, the American Psychological Association selected the Prenatal/Early Infancy Project as a model prevention program. Only fourteen programs received this honor out of hundreds surveyed over a four-year period.

Contact

David L. Olds
Department of Pediatrics
P.O. Box 777
University of Rochester Medical Center
601 Elmwood Avenue
Rochester, New York 14642
(716) 275-3738



Courtesy NGA/Matthews

Abstract

We recently completed a series of reports on a randomized trial (N=400) indicating that, in contrast to comparison services, prenatal and Infancy nurse home-visitation improved a wide range of maternal and child health outcomes among poor, unmarried, and teenaged women bearing first children in a semi-rural county in upstate New York. Eighty-nine percent of the sample was white and all analyses focused on this group. In the present report, we carried out an analysis of the net cost of the home-visitation program from the perspective of government spending. The average per-family cost of the program in 1980 dollars was \$3246 for the sample as a whole and was \$3133 for low-income families. Treatment differences in government expenditures for Aid to Families with Dependent Children, Food Stamps, Medicaid, and Child Protective Services, minus tax revenues due to maternal employment (also expressed in 1980 dollars) were conceived as government savings. By the time the children were four years of age, government savings were \$1772 (95% CI: - \$557, \$4102) for the sample as a whole, and \$3498 (95% CI: \$569, \$6427) for low-income families. Within 2 years after the program ended, after discounting, the net cost of the program (program costs minus savings) for the sample as a whole was \$1582 per family. For low-income families, the cost of the program was recovered with a dividend of \$180 per family.

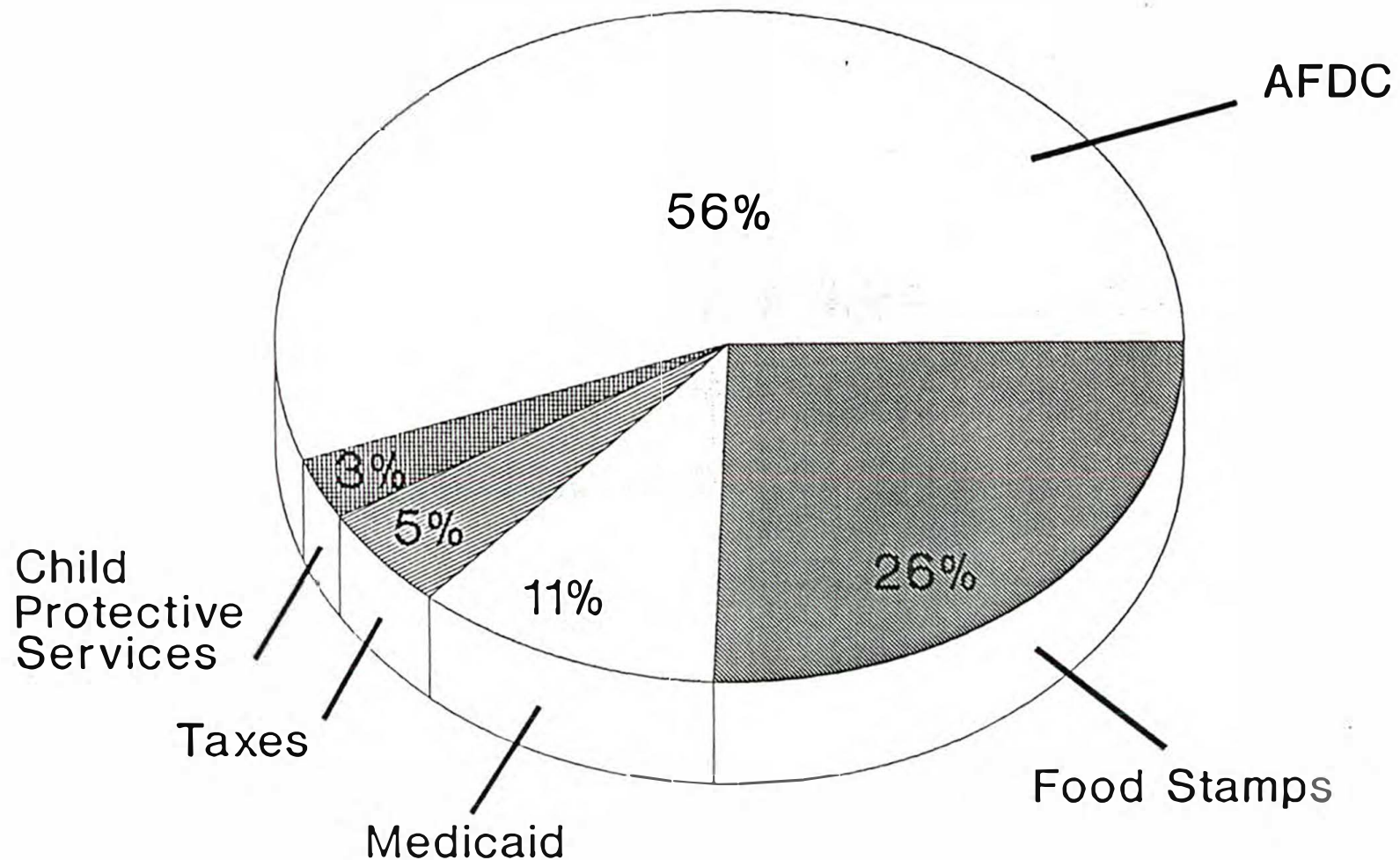
Table 4. Net Cost of Home-Visitation Program

	Whole Sample	Low-Income Families
Incremental Program Cost ¹	\$3246	\$3133
Government Savings ²	\$1664	\$3313
Net Cost	\$1582	- \$ 180

¹ Direct and secondary costs for NV-Preg/Inf - Comparison

² Present value (1980) of government costs for Comparison - NV-Preg/Inf

Figure 1. Source of Government Savings
Low-Income Families 0-48 Months



UNIVERSITY OF
ROCHESTER
MEDICAL CENTER

STRONG MEMORIAL HOSPITAL
SCHOOL OF MEDICINE AND DENTISTRY
SCHOOL OF NURSING

DIVISION OF GENERAL PEDIATRICS
AND ADOLESCENT MEDICINE
NEW MOTHERS STUDY

December 18, 1992

David L. Olds, Ph.D.
*Associate Professor of Pediatrics and
Community and Preventive Medicine*

Ms. Madge Henning
Clinton/Gore Transition, 10th Floor
Office of Mrs. Clinton
1120 Vermont Avenue NW
Washington, DC 20720

Dear Ms. Henning:

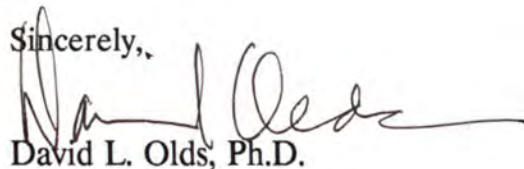
Thank you for your interest in the program of nurse home visitation that we have designed and studied in Elmira, New York, and are currently replicating in Memphis, Tennessee. I have enclosed materials that describe the program and place this kind of work in policy and program perspective.

You may wish to know that the program has received several awards during the past six years. In 1987, it was identified as a promising prevention program for children zero to five years of age by the National Governors Association; in 1988, it was identified as an exemplary primary prevention program by the American Psychological Association; and in 1991, the program and research led to my receipt of the Dana Award for Pioneering Achievements in Health. The Dana Award is considered the premiere award in preventive medicine and public health. Thus, the program has been reviewed very favorably by numerous governmental and scientific bodies. I think it is safe to say that certain members of Congress (or at least their staffs) on both sides of the aisle who are concerned about children's issues are aware of this program and research and view it positively.

If you decide that this is work that you would like to consider disseminating on a larger scale, I would be happy to assist in this process. As I mentioned on the phone, I believe the program is promising, but I also believe that there is considerable room for continuous improvement. We therefore, in my opinion, need to continue investigating those circumstances that contribute to or interfere with program success.

Please let me know if you decide to pursue this matter further, and thank you again for your interest.

Sincerely,



David L. Olds, Ph.D.
DLO:kdb

Department of Pediatrics, Box HWH
601 Elmwood Avenue
Rochester, New York 14642
(716) 275-3738 Fax: (716) 442-6112

628-8787 —

Rm 1007

~~2300~~

HRC 8

Rodham

140 South Dearborn Street
Suite 1100

Chicago, Illinois 60603-5285
Telephone: (312) 726-8000

THE JOHN D. AND CATHERINE T.
MACARTHUR FOUNDATION

December 11, 1992

TO: Melanne Verveer

FROM: Marti Rabinowitch MR

SUBJECT: City of Rochester "health care experiment"

As Adele promised, we got in touch with the Robert Wood Johnson Foundation in Princeton to get a contact for you with regard to the health care experiment in Rochester that was mentioned during our session with Mrs. Clinton. They have funded a project called "Maternal and Infant Care Program" which may (or may not) be the one in which you are interested.

I was put in touch with Dr. David Olds at the University of Rochester (716/275-3738) who is involved with two fairly large experiments, one in Elmira, a town SE of Rochester, and the other in Memphis, Tenn. The work involves the prevention of health and developmental problems in children and women, particularly in low income groups. He characterized the data that is emerging as significant and policy relevant; the Tennessee project is essentially a replication of the other in an urban setting.

I told Dr. Olds that he might expect to hear from you and that, in any event, he should send some brief written material. He said he was aware of the major programs in Rochester which is apparently developing a reputation for innovative health care systems and would be pleased to talk with you.

If this lead turns out not to be the right one, let me know and I will pursue the matter further.

cc: Adele Simmons

Atul Gawardi x1850
→ 1858
Rm. 1263

① looking at effects of
nurse visitation on women
adolescent mother
Sign. reduction child abuse
Smoking
ER visits
more jobs
fewer subsequent pregnancies
Investment is recovered with
dividend of \$180 by the
time the children are 4

teenage
unmarried
poor

② second study in Memphis, Tenn.

1100 Families - primarily people of color

intervention is institutionalized (not non-profit)

expect results in 1 yr.

→ teach women about behavior
in pregnancy which promotes
healthy babies

motivational program to provide

optimal optimal care for babies

→ involving other family members

→ basic needs are met

Prenatal / Early Infancy Project

focused on "risk" families - poor
85% were "risk" unmarried teenager

~~home based~~ &

- The parents were taught positive health + caregiving
- involve friends + family
- link family to community services

group 1 - no services

group 2 - free transportation to prenatal services

group 3 - nurse home visitation

group 4 - ~~to~~ group 3 services + 2yrs.

for low income families? The cost of

The program per family (\$3133) was recovered
by the time the children were 4 (\$3498)
with a slight dividend (\$180/family)

DO NOT QUOTE OR CITE
MEDICAL CARE, in press

Effect of Prenatal and Infancy Nurse Home Visitation on Government Spending

David L. Olds, Ph.D.

University of Rochester Medical Center

Department of Pediatrics

Charles R. Henderson, Jr.

Cornell University

Department of Human Development and Family Studies

and Center for Theory and Simulation in Science and Engineering

Charles Phelps, Ph.D.

University of Rochester Medical Center

Department of Preventive Medicine

Harriet Kitzman, Ph.D.

University of Rochester School of Nursing

Carole Hanks, Dr.P.H.

University of Rochester School of Nursing

Running Head: Net Cost of Maternal/Child Home Visits

Reprint Requests to: David Olds, Ph.D., Department of Pediatrics, Box HWH, University of Rochester Medical Center, 601 Elmwood Avenue, Rochester, NY 14642

Negotiations: David Olds, Ph.D., Department of Pediatrics, Box HWH, University of Rochester Medical Center, 601 Elmwood Avenue, Rochester, NY 14642,

Phone: 716-275-3738

Key words: cost, nurse, home visits, maternal, child, health

Effect of Prenatal and Infancy Nurse Home Visitation
on Government Spending

Abstract

We recently completed a series of reports on a randomized trial (N=400) indicating that, in contrast to comparison services, prenatal and infancy nurse home-visitation improved a wide range of maternal and child health outcomes among poor, unmarried, and teenaged women bearing first children in a semi-rural county in upstate New York. Eighty-nine percent of the sample was white and all analyses focused on this group. In the present report, we carried out an analysis of the net cost of the home-visitation program from the perspective of government spending. The average per-family cost of the program in 1980 dollars was \$3246 for the sample as a whole and was \$3133 for low-income families. Treatment differences in government expenditures for Aid to Families with Dependent Children, Food Stamps, Medicaid, and Child Protective Services, minus tax revenues due to maternal employment (also expressed in 1980 dollars) were conceived as government savings. By the time the children were four years of age, government savings were \$1772 (95% CI: - \$557, \$4102) for the sample as a whole, and \$3498 (95% CI: \$569, \$6427) for low-income families. Within 2 years after the program ended, after discounting, the net cost of the program (program costs minus savings) for the sample as a whole was \$1582 per family. For low-income families, the cost of the program was recovered with a dividend of \$180 per family.

Home visitation has been recommended in recent years as a means of improving the outcomes of pregnancy and early childrearing among at-risk women and children.¹⁻⁶ The National Commission to Prevent Mortality, for example, has promoted home visitation as a central part of its strategy to reduce infant mortality and morbidity.²⁻³ The U.S. Advisory Board on Child Abuse and Neglect has identified home visitation as the best documented strategy for preventing child maltreatment and has urged Congress to develop a national home-visitation program for all new parents.⁴ The General Accounting Office (GAO) has concluded that home-visitation is a promising early intervention service, and has recommended that Congress consider amending Title XIX of the Social Security Act to establish prenatal and postnatal home visitation as an optional Medicaid service.⁵ Some legislative initiatives, such as H.R. 1244 (The Healthy Beginnings Act), promote the use of nurse home visitors to reduce infant morbidity and mortality in high-risk communities.⁶ There is virtually no scientifically credible data, however, that compares the cost of home visitation to the savings generated by the corresponding improvements in maternal and child health. Whether such an investment in home visitation will add to the budget deficit and national debt is thus a central question for maternal and child health policy. In the meantime, at least 24 states have begun supporting maternal and child home-visitation services under a variety of Medicaid service categories.⁵

We recently completed a series of reports from a randomized trial carried out in a semi-rural area in upstate New York indicating that frequent home-visitation by nurses during pregnancy and the first 2 years of the child's life can significantly reduce many health and social problems commonly associated with childbearing among adolescent, unmarried, and low-income parents.⁷⁻⁹ For the prenatal phase of the trial, we found that, in contrast to women assigned to the comparison services (free transportation for prenatal care and well-child care and/or sensory and developmental screening for their children), nurse-visited women improved their health-related behaviors (reduced cigarette use and improved diets), experienced greater informal social support, and made better use of childbirth education and the WIC nutritional supplementation program. The positive effects of the program on preterm delivery and birthweight were concentrated on two subgroups at risk for these problems: nurse-visited smokers had 75% fewer preterm deliveries, and nurse-visited young adolescents (<17 years at

registration) bore babies with higher mean birthweights.⁷ The sample was too small to detect a reduction in the incidence of very low birthweight (< 1500 g), an infrequently occurring event. These tiny babies are at greatest risk for subsequent morbidity and high economic costs.

During the first two years of the child's life, among women with all three sociodemographic risk characteristics used for sample recruitment (that is, poor, unmarried teenagers), we observed a 75% reduction in state-verified cases of child abuse and neglect that was corroborated by observations of the mothers' treatment of their children and conditions in their homes. Moreover, in contrast to children assigned to comparison conditions (free transportation for prenatal and well-child care and/or sensory and developmental screening) nurse-visited children had 32% fewer emergency-room visits during the second year of life, which was accounted for by a 56% difference in emergency-room visits for injuries and ingestions.⁸ Finally, during the first four years after delivery, nurse-visited low-income, unmarried women participated in the work force 80% more and bore 43% fewer subsequent children than their counterparts assigned to comparison services.⁹

In this paper we analyze whether these improvements in maternal and child health were translated into government savings (averted expenditures for other government services and increased tax revenues from participation in the work force), and compare the savings to the incremental cost of the program, where incremental cost is the difference between the cost of the nursing program and comparison services.

Research Design and Methods

Sample

We carried out the study in a semi-rural county in New York State with about 100,000 residents. Between April 1978 and September 1980, we interviewed 500 primiparous women through a free antepartum clinic sponsored by the county health department and through the offices of 11 private obstetricians. We enrolled 400 women prior to their 30th week of pregnancy. We actively recruited women who were either teenagers (< 19 years at registration), unmarried, or poor (from Hollingshead classes IV and V), although we accepted low-risk women as well. Forty-seven percent were < 19 years

old; 62% were unmarried; and 61% came from Hollingshead classes IV and V (semi-skilled and unskilled laborers).^{*} Eighty-five percent of the sample had at least one of these characteristics, and 24% had all 3. Forty-six (11%) were minorities (44 African-Americans and 2 Asian-Americans). We stratified families enrolled in the program by marital status, race, and 7 geographic regions in the county, and then randomly assigned them to 1 of the 4 treatments outlined in Table 1. Details of the assignment procedure and effectiveness of the randomization can be found in our earlier reports.⁷⁻⁹ While the treatment groups were equivalent on all major sociodemographic variables, we found treatment differences in favor of the hypothesis for selected at-risk subgroups on maternal sense of control and husband/boyfriend support measured at baseline. We handled this non-equivalence by including these variables as covariates in the analysis. Our earlier reports show that sample attrition reduced the non-equivalence detected at baseline and did not undermine the integrity of the treatment contrasts.

We excluded the 46 minority women from the analyses reported here because this sample was too small to provide adequate subclass sizes when we included other factors of importance in the statistical model. We have presented the analysis of the minority sample elsewhere.¹⁰

Treatment Conditions

Treatment 1. When the children were 1 and 2 years of age, an infant specialist hired by the research project screened them for sensory and developmental problems and referred those with suspected problems to other specialists for further evaluation and treatment. We provided no services through the research project during pregnancy.

Treatment 2. Families were provided free transportation to regular prenatal and well-child care at local clinics and physicians' offices through a contract with a local taxicab company, as well as the sensory and developmental screening outlined in Treatment 1.

^{*} Hollingshead A: Four factor index of social status (unpublished manuscript), Yale University, 1976.

Treatment 3. Families were provided a nurse home visitor during pregnancy, in addition to the sensory and developmental screening services and free transportation for prenatal and well-child care. The nurses visited families approximately once every 2 weeks and made an average of 9 visits during pregnancy. Each visit lasted approximately 1 hour and 15 minutes.

Treatment 4. Families received the same services as those in Treatment 3 (transportation, screening and prenatal home visitation), but in addition the nurse continued to visit until the children were 2 years of age. For 6 weeks following delivery, the nurses visited families every week; from 6 weeks to 4 months they visited every 2 weeks; from 4 months to 14 months they visited every 3 weeks; from 14 to 20 months they visited every 4 weeks; and from 20 to 24 months they visited every 6 weeks. Under predetermined crisis conditions the nurses visited weekly. As during pregnancy, the visits lasted approximately 1 hour and 15 minutes.

Home-Visit Program

The program was designed with three broad objectives: 1) to improve the outcomes of pregnancy; 2) to improve the quality of care that parents provide to their children (and their children's subsequent health and development); and 3) to improve the women's own personal life-course development (completing their educations, finding work, and planning future pregnancies). The nurses helped women set goals and solve problems that interfered with their achieving their goals in these aspects of their lives. During their home visits, the nurses established a close working relationship with family members and carried out 3 major activities: 1) parent education about influences on fetal and infant development; 2) the involvement of family members and friends in the pregnancy, birth, early care of the child, and in the support of the mother; and 3) the linkage of family members with other health and human services.

All home visitors were registered nurses. The use of nurses was important in establishing the legitimacy of the program with local obstetricians and pediatricians. The nurses brought a knowledge of health and the health-care system to their work that enabled them to work effectively with local physicians and office staff in caring for the families they visited. The nurses were able to help families

discern genuine complications of pregnancy from common discomforts and learn about the physical health of newborn infants. The nurses' technical knowledge of health was valued by the families they visited. Many women spontaneously indicated during the research interviews that they were proud to have their own nurse, and that their nurse was critical to their adaptation to pregnancy and the birth of their first child.

Data Gathering in the Current Study

We based the present report upon data from maternal interviews, and medical and social-service record reviews. At registration, before their assignment to 1 of the 4 treatment conditions, the women were interviewed to determine their family structure, psychological characteristics, health conditions, health habits, the availability of informal support, and their childhood histories. Thereafter, the women were interviewed, and medical and social-service records abstracted at annual intervals through the child's fourth year of life, two years after the end of the program at the child's second birthday. Except in a small number of cases where participating women inadvertently disclosed their treatment assignments, all staff members who gathered data remained unaware of the women's treatment group.

Cost-Benefit Analysis

Our cost-benefit analysis compared the most relevant governmental costs for families served by the nurse-visitation program and those provided the comparison services. We estimated governmental costs incurred in carrying out the program, other governmental costs presumed to be affected by the program through improved maternal and child health, and tax revenues generated by women's participation in the work force. We expressed all program costs, other government expenditures, and tax revenues in 1980 dollars because the program was in operation between 1978 and 1982 and we wished to place the costs and benefits in the same constant-level dollars.

Most proposals for increased nurse home visitation call for governmental funding, so we assumed in this analysis that federal, state, and local governmental funds would pay for the program. We assumed that these costs would be the same as in our implementation of the experimental program in this study, after minor adjustments for certain "sunk" costs (discussed below) resulting from the

development of the program that would not have to be repeated in subsequent implementations of the program. All costs were handled on an average, per-family basis for treatment and comparison groups.

We focused the analysis on the contrast of Treatment 4 (prenatal and postnatal home visitation) versus Treatments 1 and 2 combined (comparison group). We concentrated on this treatment contrast because we found in our earlier analyses substantial health and social benefits for women and children who received both prenatal and infancy nurse home visitation (Treatment 4), but very few enduring effects of prenatal home visitation by itself (Treatment 3). We combined Treatments 1 and 2 into a comparison group because there were no differences between these groups in women's use of prenatal and well-child care, the primary reason for providing families in Treatment 2 with free transportation.⁷⁻⁹ The cost-benefit analysis corresponded to our analysis of program effects on postnatal maternal and child health outcomes.⁸⁻⁹ In the tables, we refer to Treatment 3 as NV-Preg, and Treatment 4 as NV-Preg/Inf.

Estimation of Program Costs

There were 3 components of governmental expenditures that we included in our estimate of the cost of the home-visitation program: direct costs of nurse-visitation services (e.g., nurse salaries); costs of services to which nurses linked families (e.g., WIC nutritional supplementation); and costs of the taxicab service. (Table 2 summarizes these costs for each treatment group.) We calculated the costs of the home-visitation program as "incremental costs", that is the difference between Treatment 4 and the comparison-group for the taxicab, linked services, and nurse-visitation. It is important to note that comparison as well as nurse-visited families used the services to which the nurses linked families. Taxicab costs were present for comparison and nurse-visited women as well, but the comparison-group costs are lower than those for Treatments 3 and 4 because Treatment 1 did not receive the taxicab service.

Nurse-visitation direct costs consisted of 1) the salaries and fringe benefits of the nurses, a part-time secretary, and a part-time supervisor; 2) the cost of nurses' travel and supplies; and 3) overhead charged at 16.6%. We calculated direct program costs beginning four months prior to the

randomization of families to allow for start-up expenses due primarily to the training of nurses. Two of the nurses were hired prior to this time, but their work in these early months was devoted to the development of the home-visit protocol, so it was not included in the total cost estimate. Future implementations of the program will not require the same level of costs for program development. We used nurses' records of their individual home-visits and other work with individual families to estimate the portion of direct program costs consumed by individual families.

We used records of individual families' use of the taxicab system to estimate their cab costs. In the Appendix, we specify the methods we used to estimate costs attributable to families' use of the other services with which the nurses linked families. We did not include the cost of the sensory and developmental screening in the calculation of program costs because all four treatment groups made equivalent use of this service.

Estimation of Cost Outcomes (Benefits)

Cost outcomes were those presumed to be affected by the program through improved maternal and child functioning (i.e., Aid to Families with Dependent Children (AFDC), Medicaid, Food Stamps, Child Protective Services), and tax revenues generated by women's working. The government services included here are used frequently by low-income families and, along with income-tax revenues, are likely to have been affected by the program. (We assumed that all additional government expenditures and sources of revenue would be equivalent across treatments.) We began counting the costs of these services beginning with the birth of the index child, because we found no treatment difference in use of these services or in maternal employment during the prenatal phase of the study. We aggregated the cost of these other governmental services (AFDC, Medicaid, etc.) and subtracted the tax revenues resulting from maternal employment to estimate governmental costs exclusive of program costs.

In estimating the costs of these other government services, we included only marginal costs. While this may be a conservative procedure, we did not include administrative overhead (or indirect costs) because we assumed that the program influence on these services would not be large enough to reduce the system of supports necessary to carry out these services. Note that this exclusion of

marginal costs in our estimate of these other service cost outcomes is different from our calculation of program costs, where we included administrative overhead.

We had to rely on the family's AFDC enrollment as a means of estimating both their Food Stamp use and percent of time that some families were on Medicaid during the index child's life. We used AFDC enrollment in these estimates because we did not have month-to-month data on Food Stamp and Medicaid enrollment. (We did, nevertheless, have data on whether the index child was covered by Medicaid for specific emergency-room encounters and hospitalizations, and we did have interview data on Medicaid status throughout the first four years of the index child's life that indicated whether the women and children were on or off Medicaid at the time of the interview, which we used to augment the AFDC data.)

In estimating program effects on other government expenditures associated with subsequent pregnancies and children, we assumed, conservatively, that the program would have no influence on the rates of adverse outcomes among subsequent children beyond that exerted by the reduction in the rates of subsequent pregnancy. We assumed, for example, that the nurse-visited women were equally likely to deliver subsequent children who would be admitted to neonatal intensive care and who would be abused or neglected as were their counterparts in the comparison group. We used the Medicaid and child-abuse expenses incurred by the first-born children to derive estimates of corresponding expenses for subsequent children. The details of these estimation procedures are provided in the Appendix.

Method of Discounting Savings

To adjust for differences in the time path of program costs and government savings (and thus alternative uses to which the investment in the program might be put), we adjusted the savings using a 3% discount rate. This value reflects the long-term interest rate on government bonds after adjusting for inflation.¹¹ Thus, this discounting appropriately adjusts for the time value of money and future benefits, after measuring all monetary costs and benefits in 1980 constant dollars. This adjustment reflects differences in the value of goods and services now versus those received in the future.

We discounted the savings beginning with the 13th month of the child's life, thus grouping (undiscounted) program benefits from the prenatal period and the child's first year of life. In a completely pristine discounting model, we would discount the savings beginning with the second year of program contact with the family, rather than waiting until the beginning of the child's second year of life (366th day of life). Ambiguities in measuring the exact timing of benefits between the first and second years of program operation (rather than years of the child's life) made it difficult to do this with precision. Our calculations of benefits were carried out in two 2-year periods (0-24 months and 25-48 months of life). We assumed that 75% of the savings measured in the first 2 years of the child's life occurred in the 13-24 month period, and that the savings accrued between 25 and 48 months were divided equally between the 25-36 and 37-48 month periods.

Statistical Methods

Composite Dependent Variables

The primary dependent variable for analysis was a composite of expenditures for Child Protective Services, Medicaid, Food Stamps, and AFDC minus government tax revenues. This variable represents per-family government expenditures exclusive of program costs. It was computed for 3 time intervals: 0-24 months, 25-48 months, 0-48 months. We also created composite dependent variables to reflect individual cost domains (Child Protective Services, Medicaid, etc.), as well as the costs incurred by mother and the index child, and by subsequent pregnancies and children. The methods of estimating missing data in the components of the composite dependent variables are given in the Appendix.

Model

The dependent variables were analyzed in a general linear model consisting of a $3 \times 2 \times 2 \times 2$ factorial structure that consisted of treatments (1 and 2 vs 3 vs 4) x maternal marital status (unmarried vs married at registration) x social class (Hollingshead classes IV and V vs I, II, and III) x maternal age (≤ 18 years vs > 18 at registration); all interactions among these factors; and two covariates measured at registration (maternal sense of control and reported husband/boyfriend support). Planned comparisons

focused on the contrast of the comparison group (Treatments 1 and 2) versus NV-Preg/Inf (Treatment 4). This model and our methods of analysis were identical to those used for analyzing the maternal and child health outcomes in our earlier reports of program effects on postpartum outcomes.⁸⁻⁹ We also reported earlier that the effects of the home-visitation program were concentrated on higher risk women, in particular those who were poor and unmarried.⁸⁻⁹ Consequently, some of the analyses in the present report tested treatments contrasts for selected subsamples, such as unmarried women, teenagers, and low-income families. The largest and most consistent treatment effects were concentrated on the low-income families, and thus those findings are reported here.

Results

The average incremental cost of Treatment 4 per family can be computed from Table 2. For the sample as a whole, the incremental cost was \$3246 and for low-income families was \$3133.

Table 3 summarizes the treatment differences in other government costs (savings) for the sample as a whole and for low-income women. Between birth and the child's second birthday (that is, during the 2-year period in which the program was carried out), there were no statistically significant treatment differences. During the 2-year period following the end of the program, government savings increased substantially. The estimated savings for the sample as a whole was \$1448 per family, and for low-income families was \$2230. For the entire 4-year period after delivery, the estimated per-family savings for the whole sample was \$1772, and for low-income families was \$3498. (The \$1448 savings found for the sample as a whole during the 24-48 month period was a statistically significant treatment difference; the larger \$1772 savings found for the sample as a whole for the 0-48 month period was not statistically significant because of the larger variance associated with that estimate.) Table 3 also shows the 1980 value of government savings after discounting. Through the first child's fourth year of life, after discounting, \$1664 was recovered per family for the sample as a whole, and \$3313 was recovered for low-income families.

Table 4 shows that the net cost of the program for the sample as a whole was \$1582, while the corresponding cost of the program for low-income women was -\$180.

Figure 1 shows how the \$3313 government savings among low-income families was distributed across government budgets. The data used for construction of this chart were derived from the analysis of treatment differences for the dependent variables aggregated to measure government spending within particular government budget categories. The reductions in Child Protective Services and Medicaid and the increase in tax revenues accounted for only a total of 18% of the savings. Reductions in AFDC and Food Stamps, on the other hand, accounted for a total of 82% of the savings, 56% and 26% respectively.

We carried out an analysis of the 2 dependent variables aggregated to characterize government spending (exclusive of program costs) for 1) mother and index child versus 2) subsequent pregnancies and children. Both of these variables were aggregated across individual government budgets. Thirty-two percent (\$1049) of the government savings among low-income families was due to the reduction in subsequent pregnancy. The reduction in subsequent pregnancy produced systematic reductions in Medicaid expenditures for obstetrical, newborn, and child health care; Food Stamps; AFDC; and Child Protective Services.

Summary and Conclusions

By the time the children were four years of age, two years after the end of the program, the net cost of the program for the sample as a whole was \$1582, and for low-income families was -\$180. This concentration of savings among low-income families makes sense, of course, because the poor are so much more likely to use AFDC, Food Stamps, and Medicaid services. Eighty-two percent of the savings among low-income families came in the form of reduced AFDC and Food Stamp payments. Thirty-two percent of the total savings among low-income families can be accounted for by reductions in subsequent pregnancy.

In evaluating these findings, it is important to remember that this analysis was carried out exclusively from the standpoint of government expenditures. It does not take into account the health and social benefits of the program to individuals, which are addressed in our earlier reports.⁷⁻⁹

While the estimates of financial savings are encouraging, they must be tempered with several caveats. First, we did not have Medicaid-coverage data for specific sick and well-child care encounters at physicians' offices, specific dates of Medicaid coverage for subsequent births and children, and month-by-month assessments of Food Stamp use. We had to rely on the dates of the family's AFDC utilization to estimate these expenses for some cases. It is possible that some nurse-visited women found low-paying jobs that disqualified them for AFDC but that did not pay well enough to disqualify them for Food Stamps and Medicaid. In light of the increased employment observed among nurse-visited, low-income women, it is possible that we have overstated government savings in Medicaid and Food Stamps using these assumptions.

In interpreting these findings, it is important to keep in mind that the study results derive from one trial carried out in a semi-rural area, with a white sample in 1980. We do not yet know whether these findings apply to minorities living in major urban areas in the 1990's. To determine the generalizability of the findings, we are carrying out a replication of the trial reported here in Memphis, Tennessee. In an attempt to determine the extent to which the data from this report apply today to the same community studied from 1978 to 1982, we calculated changes in the salaries of entry-level local health-department nurses from 1980 to 1992, and calculated changes in AFDC and Food Stamps payments over the same period, as these are the expenditures that account for the greatest portion of program costs and government savings. Between 1980 and 1992, entry-level nurses' salaries increased exactly 100%, while AFDC allowances increased by 82% and Food Stamps by 80% (Personal communications with Ms. Joy Bermingham, Chemung County Personnel Department and Mr. Norman Hultzman, Chemung County (New York) Department of Social Services, January 30, 1992). If we assume that all other program costs and other government expenditures increased at the same rate, the net cost of the program in 1992 would be roughly \$3464 for the sample as a whole and \$236 for low-income families. We will have better estimates of the net cost of this program in the 1990's from our Memphis study.

We also were concerned that the pattern of results produced in this cost-benefit analysis might be affected by rare but expensive events. We therefore examined the distribution of total government expenditures for each of the treatment groups. The highest total cost was \$36,465 for Treatment 1, \$36,627 for Treatment 2, \$35,306 for Treatment 3, and \$28,732 for Treatment 4. The percent of the cases with costs above \$25,000 for each treatment group was 5%, 7.4%, 6.9%, and 1.1% respectively. The mean differences reported are thus not the result of a few outlying cases.

While some of the assumptions built into the analyses carried out in this report may overstate the impact of the program on government spending and income, others are likely to understate it. First, the research design compared women who received the nurse plus transportation and screening with those who received transportation and/or screening. The transportation and screening may have elevated the functioning of the comparison group and thus reduced the range over which the program might produce positive effects.

Second, the estimate of the impact of the program on expenses related to child abuse and neglect is confined to those costs tied directly to the delivery of services to the abused children and their families, and does not consider the substantial costs associated with the small number of cases that go to court.

Third, in our estimate of program impact on Child Protective Service and Medicaid costs among subsequent children, we assumed that the program would have no impact on the incidence of child maltreatment, neonatal intensive care, or subsequent health-care utilization outside of its impact on the rate of subsequent births. This is a conservative assumption in view of the program reduction in child maltreatment for the index child,⁶ improvement in maternal prenatal health-related behaviors in the index pregnancy,⁷ and reduction in the number of closely spaced and unintended subsequent pregnancies.⁹ Consequently, this assumption is likely to understate the impact of the program on Child Protective Service and Medicaid costs for subsequent children.

Finally, the current report follows women and children only through the first four years of the children's lives. Longitudinal studies of victims of child abuse increasingly show that such children are at

risk for a variety of adverse outcomes when they reach adolescence and young adulthood, although the majority of victims do not become delinquent, criminal, or violent.¹² Similarly, longitudinal studies of adolescent parents show that although they are at increased risk for lasting social and economic disadvantage, many eventually become economically self-sufficient,¹³ without the kind of intensive program examined in this study. We do not know, for example, whether the reduction in subsequent pregnancy observed for low-income, unmarried women reflects an actual reduction in completed family size or whether it simply reflects an increase in the interval between births. A reduction in completed family size would augur for continued cost-savings to government over time, while an increase in child spacing without a decrease in completed family size would produce long-term savings at a reduced rate, and most likely only if the increased spacing allowed women to find and retain employment. It is possible, therefore, that the cost savings from home visitation will continue to accrue over time, producing life-time savings that are much larger than estimated in the current analyses. It is also possible, on the other hand, that the benefits of the program will diminish with time. Only additional longitudinal work with this sample will answer this question.

Given that 32% of the savings for low-income families reported here can be attributed to the reduction in subsequent pregnancy, one may question whether less comprehensive programs, focused more directly on family planning, may be more cost-effective. Such an approach, however, overlooks the substantial improvements in health produced for the mother and the index child in other areas, such as the reduction in child maltreatment, injuries, and ingestions. Decisions about program design should not be driven exclusively by cost considerations. Moreover, we know little about the comparative effectiveness of different methods of delivering family planning services. Our recent review of home-visitation services suggests that program success depends on the incorporation of a variety of services into the same program. Home-visit programs with narrowly defined objectives tend to be less successful overall.¹⁴ Reducing the scope of the program to focus more exclusively on family planning may reduce its impact on this outcome.

Although the current study focused on the contrast of Treatment 4 with the comparison group, examination of the tables shows that Treatment 3 (prenatal home visitation without postnatal follow-up) produced very few cost savings, and that the net cost of Treatment 3 was greater than the net cost of Treatment 4. In light of this, one may question the value of the prenatal portion of the program. While the cost of prenatal visitation in this study is high, one must note that the current design does not allow us to conclude that prenatal visitation should be eliminated from the program. The constellation of services that had the lowest net cost included both postnatal and prenatal home visitation. We have reasoned that the prenatal component of the program is important from the standpoint of allowing the nurse and mother to develop a close relationship that will set the stage for their working together during the postpartum period -- in addition to its influence on the outcomes of pregnancy. It is important to note that our review of randomized trials of home visitation indicates that those programs that initiate services during pregnancy produce larger and more extensive effects than programs that begin after delivery.¹⁴

Recent proponents of home-visitation programs for pregnant women and parents of young children argue that such programs should be provided by paraprofessional home-visitors, such as indigenous workers from the same neighborhood.^{2,4} Part of the rationale for using paraprofessionals is based on cost considerations. The evidence from randomized trials, however, indicates that the most effective home-visitation programs for these populations have used nurses. The vast majority of randomized trials of paraprofessional home-visitation programs have produced disappointing results.¹⁴ Until better evidence is available to support paraprofessional home-visitor programs, we think that it more prudent to make a larger initial investment in nurse home-visitation programs, where the probabilities of health, social, and economic benefits are greater.

Other investigators have estimated the cost savings that might be expected from an investment in various types of services for women and children, including prenatal care,¹⁵ child abuse and neglect,¹⁶⁻¹⁸ family planning,¹⁹⁻²¹ job training,²² work incentives,²³⁻²⁵ and preschool education.²⁶ With the exception of preschool education,²⁶ none of these estimates was based on randomized trials.

Moreover, most failed to compare actual utilization-of-service rates and government expenditures for a group that received services with an appropriate control group. While most investigations report that an investment in specific services can be recovered by averted use of other services later in life, such estimates often are based on predictions about service effectiveness that are not well established. Consequently, the estimates of cost savings may be highly inaccurate. Clearly, the best estimates of possible cost savings will come from randomized trials where women and children who receive such services are compared over time with families assigned to control groups. Unfortunately, it is highly unusual for cost-benefit analyses to be incorporated into randomized controlled trials.²⁷

Because the current program saved the most money when it was delivered to women in the lowest social classes, it makes sense from a strictly financial point of view to concentrate these services on low-income families, where the return on the investment is greatest. The distribution of cost savings across government budgets (Figure 1) may provide guidance to policy and program planners as they consider ways of funding this type of prenatal and infancy nurse home-visitation program. If we use the cost savings for the low-income subgroup as a reference, it is clear that the greatest savings came in a reduction in AFDC payments. If policy makers decide to move ahead with this type of program in the absence of additional data, it seems reasonable that funding for this type of comprehensive preventive program might be shared by the various government agencies that are likely to benefit financially from its effects.

Finally, if these findings are used to guide policy initiatives, it is important to emphasize that the nurse home-visitation program tested in this study was unlike many other home-visitation programs. It employed nurses who visited mothers bearing first children, and who visited frequently from pregnancy through the second year of the child's life. The nurses systematically addressed the health, behavioral, and psychosocial conditions that lead to poor maternal and child outcomes. As indicated above, home-visitation programs that do not include all of these ingredients are less likely to improve maternal and child functioning¹⁴ or reduce government expenditures for low-income families.

Appendix

Secondary Costs of Program

The program plan called for the nurses to link families with other community services. The nurse-visited families' increased use of these other services constituted secondary costs. We found no significant treatment differences for summary variables constructed to measure the number of additional community services that women used during pregnancy and each of the first four years of the index child's life. There were treatment differences in women's knowledge of services (nurse-visited women knew more) and in their use of individual services, however. In order to limit the large number of additional agencies from which we would have to request data on the cost of their service, we focused the secondary cost analysis on those services for which the difference between treatments was statistically significant. Nurse-visited women used preventive services such as the WIC nutritional supplementation program and child-birth education more frequently, while women in the comparison conditions used crisis services, such as family-counseling and mental-health services more frequently. (There were no differences in women's use of center-based day care, in spite of the nurse-visited poor, unmarried women's greater participation in the work force, as they relied primarily on other family members for child care.)^{10,26} We obtained the "unit cost" of program operation for each service, using the agencies' own estimates of their unit costs. We then multiplied the unit cost by the women's estimates of the number of times that they used the service. Table 2 includes the results of these calculations.

Other Government Cost and Revenues

Child Abuse and Neglect Costs

Index Child. We derived estimates of child abuse and neglect costs from: 1) reviews of State Child Protective Service records concerning the incidence and characteristics of maltreatment in our sample, and 2) county records of costs falling into 3 categories: initial investigation, ongoing supervision, and foster care. We calculated the costs in these 3 categories on a case-by-case basis. Unit costs for investigation were calculated on the basis of 1) the number of cases investigated in the county during

the study years, and 2) the salaries of the investigative staff within the child-protective-services division of the local department of social services. These estimates did not include administrative overhead. The average investigation cost \$249.

We calculated costs to provide ongoing supervision of cases using similar procedures (e.g., based on number of cases followed, salaries of ongoing staff). We estimated the cost per case on a per-diem basis because cases were assigned to the "ongoing" unit for varying lengths of time. The department of social services was unable to provide us with an estimate of the length of time that a typical case was followed in the ongoing unit, so we derived an estimate from the average length of time that a case was "open" (being served by child-protective service workers) in our own sample of maltreatment cases. Cases were assigned to the ongoing unit within the child-protective-service unit after they had been open for more than 90 days (the state-mandated point at which cases were transferred from the investigative unit to the ongoing unit). Using these procedures, we estimated that the typical case cost \$5.41/day while it was being followed in the ongoing unit. We then multiplied by \$5.41 the number of days that each case in our sample was open beyond the initial investigation period of 90 days.

For those cases in which the child was removed from the home and placed in foster care, we calculated the cost of foster care by multiplying the number of days in foster care by \$11.75, the foster-care reimbursement rate for children in this age range. All costs for maltreatment were aggregated for Years 1 and 2 of the index child's life and then for Years 3 and 4 separately.

Subsequent Children. We estimated the costs of maltreatment among subsequent children from our estimates of costs attributable to the maltreatment of first-born children in the comparison group. We assumed that the program would have no impact on the rates of maltreatment among subsequent children, and that any reduction in cost would occur solely from the reduction in the number of subsequent births. We assumed that the cost of maltreatment among subsequent children would be shared by all subsequent children. We estimated the cost of abuse and neglect averaged over all first-

born children in the comparison group (both maltreated and not) for each year of life and applied it to all subsequent children.

During the first and second years of life combined, a total of \$32,835 was spent on child-abuse for all children in the comparison group, \$26,070 in the third year of life, and \$17,985 in the fourth year of life. Each maltreated first-born had an average cost of \$1,784 for Years 1 and 2 combined, and \$1,486 and \$1,248 for each of the next 2 years of life. When we averaged these costs over all first-born children, we obtained estimates of \$199 ($\$32,835/165$) for the first 2 years of life combined, and \$158 ($\$26,070/165$), and \$109 ($\$17,985/165$) for the third and fourth years of life respectively. We assigned these maltreatment costs to each subsequent child (adjusted for the timing of the subsequent birth) and applied them to the cost stream in correspondence to the year of the first child's life. Subsequent children born 9 months after the birth of the first, for example, would incur only 125% of the first- and second-year costs ($1.25 \times \$199$) but would incur 100% of the third- and fourth-year costs.

Taxes

We estimated the amount of state and federal income taxes and Social Security taxes paid through the 4th year after delivery of the first child. We derived data for estimates of taxes from interviews with women at around the first child's 24th, 36th, and 48th months of life. We gathered data on the number of months employed, whether they worked full or part time, their income, and their occupations. In some cases, we had to estimate gross income from reported net income; in others, where income was not provided, we had to estimate income from occupations, using labor statistics for the region in New York State in which the program was carried out.²⁹ We assumed that all women (including those who were married) filed as single heads of households. While this is a conservative procedure in that the amount of tax paid is reduced for this filing status (and given that more poor, unmarried women in Treatment 4 worked than did those in the comparison group),⁹ it is not likely to affect the calculations of the amount of tax paid because most women worked in occupations that paid too little to generate income tax. Only Social Security tax led to any substantial tax payments.

Changing the filing status would have increased the amount of tax only a small amount because the tax

brackets are quite large in the range of incomes found in this sample. In calculating state and federal income tax, we used standard deductions based on the number of children in the household, and assumed that taxes paid would be based on earnings over the 12-month interval preceding the interview. In 28 cases, women were employed in occupations in which they were unlikely to report their income for purposes of taxation; these occupations included baby sitting, small sales businesses (cosmetic and house-ware sales) and house cleaning. They were assigned values of zero for amount of state, federal, and Social Security tax paid.

Medicaid Costs

Index Child. We estimated Medicaid costs attributable to the first child by multiplying the number of health-care encounters (i.e., number of days in regular newborn nursery or neonatal intensive care, well-child exams, sick visits, emergency-room visits, and days hospitalized) by the 1980 New York State Medicaid reimbursement rates for physicians³⁰ and for the 2 local hospitals. These calculations took into consideration the child's Medicaid status at the time of the individual encounter. For hospitalizations and emergency-room visits, our record reviews indicated Medicaid status. For sick and well-child visits at the physicians' offices, we had to estimate Medicaid coverage from AFDC enrollment and interview data that indicated whether women and children were on or off Medicaid at the first child's 6th, 12th, 24th, 36th, and 48th months of life. We adjusted sick and well-child costs by the percentage of the time the family was on Medicaid during the appropriate year of the index child's life.

Subsequent Pregnancy. We had no detailed data on Medicaid coverage for subsequent pregnancies and children. We therefore also adjusted the cost for subsequent pregnancies outlined below by the percentage of time that the family was estimated to be on Medicaid during the year of the index child's life that the costs were incurred.

Our data on the outcome of subsequent pregnancies were not as detailed as the outcome of first pregnancies. Although the interview data indicated whether the subsequent pregnancy ended in a live birth, still birth, spontaneous or therapeutic abortion, we had no data on whether the pregnancy led to cesarean delivery or neonatal intensive care unit (NICU) admission. Consequently, we included the

additional cost of these less frequently occurring (and more expensive) procedures, such as cesarean sections (c-sections) and NICU admissions, in a summary variable that reflected the average total cost of all subsequent pregnancies that did not end in therapeutic or spontaneous abortion. This summary variable covered the costs of the following general categories: 1) obstetrical care (reimbursement to physicians for prenatal care, labor, and delivery, including c-section and anesthesia); 2) maternal hospitalization for normal and c-section labor and delivery; and 3) newborn hospitalization (both regular nursery and neonatal intensive care). We estimated spontaneous or therapeutic abortions separately at \$40.78 and \$120.78 respectively. They were not included in the summary variable, since we knew which subsequent pregnancy ended with this outcome. (We assumed no hospital charges for abortions.)

For physician charges, we assumed that the rate of c-section in subsequent pregnancies would be the same as the rate observed in the first pregnancies, 10%.¹⁰ Using an average of \$340 for total obstetrical care that ended in c-section and \$264 for normal total obstetric care (including anesthesia for both types of deliveries), we derived an average obstetrical-care charge of \$272. We applied this amount to all subsequent births that did not end in spontaneous or therapeutic abortion.

For hospital charges, we estimated that women would be hospitalized 3 days for labor, delivery, and postpartum care at \$170.31 per day plus \$4 for a physical exam, leading to an average charge of \$515 per delivery. Medicaid paid twice as much for a day of hospitalization in the NICU as in the normal newborn nursery. We used the average NICU stay in the sample of first births in this study (14.72 days) to calculate subsequent newborn costs.¹⁰ After including NICU charges, the average subsequent newborn charge was estimated at \$556. We assumed that the same percentage of births would be admitted to the NICU for subsequent pregnancies as we observed in our sample of first-borns (12%).¹⁰ We assumed, conservatively, that any reduction in NICU costs would be limited to the reduction in subsequent pregnancies alone; that is, there would be no proportional reduction in NICU admissions on the part of nurse-visited women because of improved conditions for pregnancy.

Subsequent Children. We estimated Medicaid expenditures for subsequent children for each of the 4 years after birth of the first child. We estimated these expenditures from the Medicaid costs of

first-born children in the sample who were on Medicaid for each of the 4 years of life (0-12 months, 13-24 months, etc.). These cases had total Medicaid costs (excluding newborn costs) of \$616, \$343, \$154, and \$154 for each of those years.

We adjusted all Medicaid costs for subsequent children by our estimate of the percent of time that the family was covered by Medicaid during the year the subsequent child was alive (indexed by the age of the first child).

AFDC and Food Stamps

Mother and Index Child. We derived estimates of AFDC and Food Stamp allowances from the birth of the first child until his or her fourth birthday from interviews with women and reviews of records of the county Department of Social Services. The record review was carried out on cases in which women's being unmarried, a teenager, or from Hollingshead social classes IV or V made them more likely to use AFDC, or where interview data indicated that they had been recipients. The interviews that produced data on AFDC and Food Stamp use were carried out at around the 24th and 48th months of the children's lives.

We multiplied the number of months on AFDC by an estimated AFDC allowance of \$250 per month for a family of 2 (mother and child), plus a corresponding Food Stamp allowance of \$113 per month. (The maximum AFDC allowance in 1980 for a family of 2 was \$313.50.* Since most payments were at the high end, we believe that the AFDC estimate is conservative.) The \$250 and \$113 payments were reviewed by staff from the county Department of Social Services and were corroborated by interview data on sources of income from our own sample. We calculated Food Stamp expenditures only for those families that received AFDC, because we were unable to derive reliable data from the

* Personal communication. Mr. Norman Hultzman, Coordinator WMS-MMIS, Chemung County Department of Social Services; August 20, 1987.

county on number of days or months during which Food Stamps were used. Consequently, we only considered those families who used AFDC and Food Stamps.

Subsequent Children. For women who gave birth to subsequent children, we used the date of subsequent births to calculate AFDC payments. For each additional child, we calculated an increase of \$60 per month in AFDC and \$30 in Food Stamps; these increments also were supplied by the local Department of Social Services. For subsequent children born before the 24th month of the first child's life, for example, we estimated how many days subsequent children were included in the calculation of the family's AFDC and Food Stamp payments prior to the index child's second birthday. We calculated the percentage of time between birth and the 24th month of life that the family was on AFDC and multiplied that percentage by the number of days (transformed to months) that each subsequent child was alive before the 24th month of life of the first child. We multiplied this product by \$60 for AFDC and \$30 for Food Stamps to calculate the increments in these budgets associated with an additional child in 1980. We employed corresponding procedures for the period spanning the 25th to 48th month of life for each additional child.

Estimating Missing Data

There were missing data in the individual components of the composite dependent variables. These components consisted of variables such as Medicaid costs for emergency-room visits from 0-24 months of life, corresponding costs for 25-48 months, tax revenues from 25-48 months of life, etc. The amount of missing data for any one component was typically in the 20% - 25% range. The missing data occurred only in the components of the dependent variables and not in the independent variables. There are a variety of ways to estimate the missing data. (Working only with the complete data is not an option because of the considerable number of variables making up the scales and the likelihood of some component being missing.) We used an estimation procedure that takes into account both the model for analysis of the composite cost outcome variables (after missing data have been estimated) and all existing data for each subject.³¹⁻³² This method makes use of the repeated-measures structure of the data (observations at several time points for each cost area, such as Medicaid costs for emergency

room visits from 0-24 months, 25-48 months, etc. for each individual) and an assumed covariance structure. Estimation was by likelihood-based iterative methods such as EM and Fisher scoring. Values were imputed if there was an observation on at least one level of the repeated measure, and all data on independent variables were observed. We used this method working with the basic model (described above).

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References

1. Wagner JL, Herdman RC, Alberts DW. Well-child care: How much is enough? Commentary. Health Affairs. September 1989;147-157.
2. National Commission to Prevent Infant Mortality. Home Visiting: Opening Doors for America's Pregnant Women and Children. Washington, D.C., 1989.
3. National Commission to Prevent Infant Mortality. Death Before life: The Tragedy of Infant Mortality. Washington, D.C., 1988, page 21.
4. U.S. Advisory Board on Child Abuse and Neglect. Creating Caring Communities: Blueprint for an Effective Federal Policy on Child Abuse and Neglect. U.S. Government Printing Office, Washington D.C., September 1991:141-146.
5. U.S. General Accounting Office. Home Visiting: A Promising Early Intervention Strategy for At-risk Families. Washington D.C.: U.S. Government Printing Office, 1990; HRD-90-83.
6. Healthy Beginnings Act of 1991. Kennedy, Hon. JP. Congressional Record. March 6,1991;HR1244:E782-783.
7. Olds DL, Henderson CR, Tatelbaum R, Chamberlin R. Improving the delivery of prenatal care and outcomes of pregnancy: a randomized trial of nurse home visitation. Pediatrics 1986; 77:16-28.
8. Olds DL, Henderson CR, Chamberlin R, Tatelbaum R. Preventing child abuse and neglect: a randomized trial of nurse home visitation. Pediatrics 1986; 78:65-78.
9. Olds DL, Henderson CR, Tatelbaum R, Chamberlin R. Improving the life-course development of socially disadvantaged mothers: a randomized trial of nurse home visitation. Am J Public Health 1988; 78:1436-1445.
10. Olds DL, Henderson CR, Birmingham, M, Chamberlin R, Tatelbaum R. Final Report: Prenatal/Early Infancy Project. Final Report to Maternal and Child Health and Crippled Children's Services Research Grants Program, Bureau of Community Health Services, HSA, PHS, DHHS, Grant No. MCJ-36040307, November 1983.
11. Barro RT. Macroeconomics. New York: Wiley, 1984.

12. Spatz Widom C. The cycle of violence. Science 1989; 244:160-166.
13. Furstenberg FF, Brooks-Gunn J, Morgan SP. Adolescent Mothers in Later Life. New York: Cambridge University Press, 1987:48-76.
14. Olds D, Kitzman, H. Can home visitation improve the health of women and children at environmental risk? Pediatrics 1990; 86:108-116.
15. Institute of Medicine. Preventing Low Birthweight. Washington, D.C.: National Academy Press, 1985.
16. Dubowitz H. Costs and effectiveness of interventions in child maltreatment. Child Abuse Negl 1990; 14:177-186.
17. Fink A, McCloskey L. Moving child abuse and neglect prevention programs forward: improving program evaluations. Child Abuse Negl 1990; 14:187-206.
18. Armstrong KA. Economic analysis of a child abuse and neglect treatment program. Child Welfare 1983; 62:3-13.
19. Witwer L. Wisconsin's Grandparent Liability Law Saved Very Little State Money and Averted Few Teenage Births. Fam Plann Persp 1989; 21(5):230-231.
20. Dryfoos JG. School-based health clinics: three years of experience. Fam Plann Persp 1988; 20:194-200.
21. Forrest JD, Singh S. The impact of public-sector expenditures for contraceptive services in California. Fam Plann Persp 1990; 22:161-168.
22. Harlan SL. Federal job training policy and economically disadvantaged women. In: Larwood L, Stromberg AH, Gutek BA (eds.), Women and Work. Beverly Hills: Sage Publications, 1985:282-311.
23. Gueron JM. Reforming Welfare with Work. New York: Ford Foundation, 1987.
24. Garvin CD, Smith AD, Reid WJ. The Work Incentive Experience. Montclair, N.J.: Allanheld, Osmun and Co., 1978.

25. Levitan SA, Johnston BH. The Job Corps. Baltimore: Johns Hopkins University Press, 1975.
26. Barnett WS. The Perry Preschool Program and its Long-Term Effects: A Benefit-Cost Analysis. Ypsilanti, Michigan: High/Scope Educational Research Foundation, 1985.
27. Adams ME, McCall NT, Gray DT, Orza MJ, Chalmers TC. Economic analysis in randomized control trials. Medical Care 1992; 30:231-238.
28. Olds DL, Lombardi J, Birmingham M, Henderson C. Final report: Prenatal/Early Infancy Project. A Follow-Up Evaluation at the Third and Fourth Years of Life. Final report to the Ford Foundation (Grant No. 840-0545) and the William T. Grant Foundation (Grant No. 840723-80), November 1986.
29. New York State Department of Labor. 1987 Annual Labor Area Report for Elmira, Fiscal Year 1987. August 1986.
30. New York State Department of Health. New York State Medical Fee and Procedure Schedule. August 1980.
31. Berk K. Computing for incomplete repeated measures. Biometrics 1987; 43:385-398.
32. Jennrich RI, Schluchter MD. Unbalanced repeated-measures models with structured covariance matrices. Biometrics 1986; 42:805-820.

Table 1. Services Provided in Each of the Four Treatment Groups

	TREATMENT GROUP			
	1	2	3	4
SERVICES PROVIDED	n=90	n=94	n=100	n=116
Health and developmental screening at the children's 12th and 24th month of life	+	+	+	+
Free transportation to regular prenatal and well-child visits		+	+	+
Nurse home visitation during pregnancy			+	+
Nurse home visitation during the children's first two years of life				+

Table 2. Average Program Costs (Direct and Secondary in 1980 Dollars) for Individual Families by Treatment - Whole Sample and Low-Income

Source of expense	Comparison		NV-Preg		NV-Preg/Inf	
	Whole Sample N = 161	Low-Income N = 99	Whole Sample N = 87	Low-Income N = 55	Whole Sample N = 94	Low-Income N = 54
Nurse Program	0 (0)	0 (0)	\$1045 (\$493)	\$1049 (\$560)	\$3227 (\$1615)	\$3125 (\$1594)
Linked Services	\$808 (\$578)	\$961 (\$564)	\$934 (\$583)	\$1112 (\$544)	\$747 (\$531)	\$852 (\$527)
Cab	\$13 (\$29)	\$19 (\$34)	\$30 (\$36)	\$31 (\$34)	\$32 (\$37)	\$34 (\$36)
Total	\$821 (\$582)	\$980 (\$565)	\$2020 (\$700)	\$2193 (\$695)	\$4067 (\$1661)	\$4113 (\$1668)

Note: Standard deviations in parentheses.

Comparison = Treatment 1 + Treatment 2; NV-Preg = Treatment 3; NV-Preg/Inf = Treatment 4.

NV denotes nurse-visited.

Table 3. Estimate of Government Savings (Treatment Differences in Other Government Costs) by Time Interval

	0-24 months				24-48 months				0-48 months			
Treatment Group ^a	Whole Sample		Low-Income Families		Whole Sample		Low-Income Families		Whole Sample		Low-Income Families	
	— X	N	— X	N	— X	N	— X	N	— X	N	— X	N
Other Gov't Costs												
Comparison	\$3658	(161)	\$5132	(99)	\$4587	(161)	\$6709	(99)	\$8244	(161)	\$11841	(99)
NV-Preg	\$4002	(87)	\$5378	(55)	\$4380	(87)	\$5579	(55)	\$8383	(87)	\$10958	(55)
NV-Preg/Inf	\$3333	(94)	\$3864	(54)	\$3139	(94)	\$4479	(54)	\$6472	(94)	\$ 8343	(54)
Savings =												
(Comparison -												
NV-Preg/Inf)	\$ 325		\$1268		\$1448*		\$2230**		\$1772		\$3498*	
95% C.I.	[-\$921,\$1570]		[-\$298,\$2835]		[\$180,\$2715]		[\$636,\$3824]		[-\$557,\$4102]		[\$569,\$6427]	
Present Value												
(1980) of Gov't												
Savings ^b	\$ 319		\$1242		\$1345		\$2071		\$1664		\$3313	

*p<.05 **p<.01

^a Comparison = Treatment 1 + Treatment 2; NV-Preg = Treatment 3; NV-Preg/Inf = Treatment 4.

^b Government savings discounted at 3 percent, following assumptions outlined above, and operationalized as follows: $D_1 = (S_1 * .75)/1.03 + .25(S_1)$; $D_2 = (S_2 * .50)/1.03^2 + (S_2 * .50)/1.03^3$; where D_1 = discounted savings (0-24 months); S_1 = undiscounted savings (0-24 months); D_2 = discounted savings (0-24 months); and S_2 = undiscounted savings (0-24 months).

Table 4. Net Cost of Home-Visitation Program

	Whole Sample	Low-Income Families
Incremental Program Cost ¹	\$3246	\$3133
Government Savings ²	\$1664	\$3313
Net Cost	\$1582	- \$ 180

¹ Direct and secondary costs for NV-Preg/Inf - Comparison

² Present value (1980) of government costs for Comparison - NV-Preg/Inf

Figure 1. Source of Government Savings
Low-Income Families 0-48 Months

