

**IMMUNIZATION GRANT APPLICATION GUIDANCE CONTENT
RELATED TO POPULATIONS AT GREATEST RISK OF
VACCINE-PREVENTABLE DISEASES/UNDERVACCINATION
AND POCKETS OF NEED**

- CDC has a long history of urging States to address populations at high risk of disease outbreaks. During the 1970s and early 1980s, the majority of measles cases were in school-age children and grant guidance focused on implementing school immunization laws to address this problem. As the epidemiology of measles changed and the majority of cases began occurring in the preschool population, the program emphasis shifted accordingly.
- For many years, grant guidance has also focused on the importance of identifying populations at highest risk of underimmunization. For example, in 1980, CDC's immunization grant guidance recommended "scheduling of special immunization clinics in defined geographic areas in population groups of particularly high susceptibility."
- Data from the 1989-1991 measles epidemic revealed that children living in poverty in major urban areas were at highest risk for contracting the disease. In 1989, CDC published an announcement for cooperative agreements for "intervention projects to develop innovative ways to identify and vaccinate preschool-age...children living in inner-city, high disease morbidity areas."
- In 1991, CDC supported demonstration projects to develop and implement community-based action plans in 6 cities with large underimmunized populations. Grant guidance that year indicated that "Special attention will be focused on the economically disadvantaged and medically underserved in the areas of excessive morbidity." Supplemental guidance invited eligible grantees to submit requests to fund model immunization program demonstrations "...in high-risk, underserved inner-city metropolitan areas..."
- Based on the "6 City" projects, CDC directed all 64 immunization grantees to develop similar immunization actions plans (IAPs) to increase immunization services. In 1992, grant guidance stated that "While this is a universal program, special attention will be directed toward economically disadvantaged and medically underserved infants and children in areas of excessive vaccine-preventable disease morbidity." The guidance also called for a "...detailed, long-range plan to assure that immunization coverage improves, especially among populations in areas with the lowest levels of coverage."
- Supplemental 1992 guidance (the Immunization Action Plan Guidance) targeted

24 non-grantee urban areas "...selected on the basis of population size and the percent of minority population within the core city..." for funding and enhanced technical assistance.

- In 1994, grant guidance continued to emphasize the importance of focusing on "... (1) economically disadvantaged and medically underserved infants and children and (2) infants and children residing in areas experiencing excessive vaccine-preventable disease morbidity."
- As immunization coverage increased and vaccine-preventable disease rates decreased, CDC further intensified efforts to target areas at highest risk for underimmunization through policy statements, grant guidance and technical support visits. In 1996, grant guidance directed grantees to include in their applications "...information describing coverage among racial and ethnic minority populations, other population sub-groups known to be at high risk for underimmunization, or geographical areas with lower-than-average coverage levels." Since most grantees did not have such coverage data, CDC outlined the concept of using surrogate measures to identify these at-risk subpopulations.
- Beginning in 1996, grantees were required to include in their annual progress reports information describing their efforts in pockets of need.
- In 1997, CDC issued Grant Guidance introducing the term "pockets of need" and focused on identifying pockets, measuring and monitoring coverage within each pocket, and implementing various interventions in the pockets to raise coverage.
- The 1998 and 1999 guidance documents include specific requirements for grantees to (1) identify pockets of need, (2) identify undervaccinated children within those pockets, (3) ensure the identified children receive the appropriate immunization services, and (4) measure and monitor immunization coverage levels in the pockets.
- In summary, the CDC effort on populations at risk of undervaccination and pockets of need has been an evolving process, receiving ever greater emphasis as other elements of the program have come into place and population-wide coverage has increased.

IAP/POCKETS OF NEED

In 1991, the National Immunization Program (NIP) identified 23 urban areas (in addition to five already-existing urban grantees) as targets for development of their own Immunization Action Plans (IAP) to enhance efforts to identify and vaccinate high-risk subpopulations. The selection of these areas was based on population size and the proportion of individuals from racial and ethnic minority groups residing in the core city. Besides supporting the cost of delivering immunizations, the IAP approach was unique in that it involved both traditional public health providers and non-traditional community partners in program planning and implementation.

To sustain and further reduce low vaccine-preventable disease incidence, additional emphasis must be placed on:

- 1) identifying and defining smaller geographic areas or sub-population groups at high risk for underimmunization;
- 2) measuring and monitoring immunization coverage in those areas; and,
- 3) implementing measures designed to achieve high coverage among high-risk groups in these areas. These geographical subdivisions may consist of groupings of census tracts, distinct communities, health provider shortage areas (HPSAs) or other geographically-defined areas.

In 1996, NIP identified, for intensive follow-up and technical assistance, 11 major urban areas (New York City, Philadelphia, Newark, Miami, Chicago, Detroit, Dallas, San Antonio, Houston, Phoenix, and Los Angeles) that have the largest numbers of undervaccinated preschool children and/or the greatest potential for vaccine-preventable disease outbreaks (pockets of need). NIP published grant guidance for FY 1997 which directs all immunization grantees to identify pockets of need and intensify efforts to raise coverage in these areas.

Immunization Pockets of Need:

Science and Practice

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Abstract

Despite high overall immunization coverage levels among US preschool children, areas of underimmunization, called pockets of need, remain. These areas, which pose both a personal health and a public health risk, are typically poor, crowded, urban areas in which barriers to immunization are difficult to overcome and health care resources are limited.

CDC administers a federal grants program that funds state and metropolitan immunization programs. This program promotes a three-pronged approach for addressing pockets of need: (1) identification of target areas, (2) selection and implementation of programmatic strategies to improve vaccination coverage, and (3) evaluation of progress or impact. At each step, scientific evidence can guide programmatic efforts.

While there is evidence that state and metropolitan immunization programs are currently making efforts to address pockets of need, much work remains to be done to improve vaccination coverage levels in pockets of need. Public health must take on a broadened role of accountability, new partnerships must be forged, and it may be necessary to strengthen the oversight authority of public health. These tasks will require a concentration and redirection of resources to support the development of an immunization delivery infrastructure capable of ensuring the timely delivery of immunizations to the most vulnerable of America's children.

Introduction

Despite unprecedented high aggregate vaccination coverage levels among US preschool children, local surveys demonstrate the existence of areas of low vaccination coverage in which children are at significantly greater risk of vaccine-preventable diseases.^{1 2 3} Called “pockets of need” by the General Accounting Office,⁴ these are typically urban, underserved areas, characterized by crowding, poverty, and inadequate health care utilization, which act synergistically to produce low vaccine coverage levels and raise disease risk.

Low vaccination coverage levels pose not only a direct threat to people living in those areas, but also present an indirect threat to other populations by allowing development of potential reservoirs of circulating pathogens that can lead to transmission of disease. Areas with low coverage levels also jeopardize the complicated public health strategies of disease elimination and eradication,^{5 6} which require extremely high coverage levels for success. Currently, several vaccine-preventable diseases are targeted for eradication (poliomyelitis) or elimination (measles, rubella, and *H. influenzae* type b).

One key feature of pockets of need is that the children living within them experience more numerous or more severe barriers to the timely receipt of vaccinations. Interventions exist that can help children overcome many of these barriers to vaccination, but before these interventions can be applied, target areas must be identified and strategies to evaluate the intervention should be developed.

In this report we will briefly review the literature about barriers to vaccination of preschool children in pockets of need. We will then focus on pockets of need from several perspectives: scientific issues concerning identification, intervention, and

evaluation; CDC policy, practice, and grant guidance; activities currently being implemented by state and large urban immunization programs; and remaining work.

Barriers to Immunization

The body of research about barriers to immunization is substantial. Several factors, such as parental and provider attitudes and ability to identify an immunization provider, previously believed to be barriers, have not been supported by the scientific literature. Others, such as socioeconomic factors, parental awareness, provider practices, and the information gap, have been consistently shown to be barriers to immunization. (Table 1.)

Prior to the 1990s, it was commonly believed that children were underimmunized because parents and providers did not place a high priority upon childhood immunizations. Subsequent research, however, has disproved both conjectures. Parents have been shown to be generally in favor of immunization; parental attitudes toward vaccination are not significantly associated with vaccination status;^{7 9} and providers^{8 9} and their professional organizations¹⁰ place a high priority on childhood immunizations.

Inability to identify a primary care provider was also generally considered to be a major barrier to timely vaccination. Data from underserved, urban areas, however, have demonstrated that the vast majority of children in pockets of need are able to identify a primary care provider. For example, a door-to-door household survey conducted in four federally-designated health care provider shortage areas (HPSA) found that greater than 95% of preschool children had a medical home for comprehensive primary care,¹¹ and that all children could identify an immunization providers. In addition, a study conducted in a public housing project in Chicago revealed that 94% of children were able to identify

an immunization provider.³ As discussed below, however, the ability to identify a primary care provider does not imply adequate utilization of services.

If parent and provider attitudes and inability to identify an immunization provider are not responsible for undervaccination, why are many children incompletely vaccinated? Barriers with a strong relationship to underimmunization include socioeconomic factors, utilization of services, parental knowledge, provider practices, and record scattering.

The first barrier, especially salient in pockets of need, involves socioeconomic factors, including poverty, cost to parents, and cost to providers.¹² Data from the 1998 National Immunization Survey¹³ illustrate the link between poverty and underimmunization. For example, children with family incomes below the federal poverty level had consistently lower immunization coverage levels when compared to middle income (up to 12 percentage points lower, depending on the vaccine) and high income (up to 21 percentage points lower) children. Numerous studies have also demonstrated an association between socioeconomic status¹⁴ or its correlates (e.g., household type, maternal age/education)^{15 16 17 18} with underimmunization. In addition to poverty, costs to families^{19 20} and to providers²¹ also pose a barrier to immunization. Interventions that circumvent these socioeconomic factors have been developed and are discussed later in this report.

A second important barrier to preschool immunization involves utilization of services. In analyzing 1993-1994 National Health Interview Survey data, Newacheck et al found that uninsured children were less likely than insured children to have a regular source of care, to have had contact with a physician during the previous year, and to have access to non-emergency medical care after hours.²² The consequence of unequal

utilization is particularly important for immunization because children must make at least seven visits to a health care provider in the first two years of life in order to complete the primary immunization series. One important challenge in achieving adequate utilization of preventive care for preschool children is the “toddler gap”²³ that results from disengagement of families from the well-child care and immunization process after the first year of life.²⁴

In addition to utilization of services, four additional barriers have been consistently identified in the literature: (1) parents’ lack of knowledge about their children’s true vaccination status;^{25 26} (2) clinicians’ failure to operate information systems to identify and recall children in need of immunizations or to conduct practice-based assessments of immunization coverage;^{8 27 28} (3) scattering of immunization records across multiple providers;²⁹ and (4) missed opportunities to vaccinate children at non-preventive care visits.³⁰ These barriers amount to an *information gap* that can prevent children from receiving vaccinations in a timely manner. The increasing number of vaccinations and the shift of patients from health departments to private practices exacerbate this gap.

Barriers such as socioeconomic factors, utilization of services, parental awareness, provider practices, and scattered records act synergistically in pockets of need. In these areas, barriers that exist in more affluent areas may be more difficult to surmount where populations are vulnerable and resources are scarce.

Scientific and practical challenges in addressing pockets of need

Improving coverage levels in areas with low vaccination coverage requires a three-step process: (1) identification of target areas, (2) selection and implementation of

programmatic strategies to improve vaccination coverage, and (3) evaluation of progress or impact. At each step, scientific evidence can help to guide programmatic efforts.

Identification of pockets of need

Since the major goal of vaccination programs is to reduce the burden and risk of vaccine-preventable diseases, disease surveillance would seem to be a logical approach for identifying areas in need of intervention. For example, the measles resurgence in the US that took place between 1989 and 1991 provides an important example in which the population of a small number of counties suffered the majority of the disease burden.³¹

However, because the current incidence rates of vaccine-preventable diseases for which adequate surveillance data exist are low, disease surveillance as an indicator of pockets of need is not sensitive enough to be useful. For example, few cases of measles occur in the US today, and those cases that do occur are believed to be importations from other countries rather than indigenously circulating measles virus.³² A second problem is that this method does not allow for the identification of areas at risk for outbreaks *before* they occur. Finally, with certain diseases, such as pertussis, the correlation between preschool coverage rates and incidence is complicated by vaccine efficacy that is lower than desired and by changes in disease epidemiology and surveillance over time.³³

Given the inadequacy of disease surveillance as a means to identify pockets of need, a number of other methods have been used by state and metropolitan immunization program staff. These include data from the National Immunization Survey, surrogate measures, school-enterer surveys, immunization registries, and provider-based assessments. Most programs rely on a combination of methods to identify pockets of need within their jurisdictions.

One method for identifying large urban areas with low immunization coverage is to review data collected via the National Immunization Survey (NIS).³⁴ Conducted on an ongoing, quarterly basis by the CDC, NIS collects provider-verified immunization history information on approximately 400 children from each state and 28 urban areas each year. Findings are used to estimate national, state, and certain large urban area coverage, which CDC uses to target its technical assistance to immunization programs. CDC is currently in the process of modifying the NIS to include insurance and health care utilization questions that will provide useful information about children in pockets of need. CDC distributes NIS data to immunization program staff on a regular basis. Individual immunization programs may use these data to provide general information about underimmunization in their jurisdictions, but the sample size is not sufficient to provide accurate or stable small area estimates of coverage.

A second commonly-used method for identifying pockets of need is the use of surrogate measures. Surrogate measures are demographic and socioeconomic variables, such as average income level, percent of the population receiving Medicaid, and maternal education, which are associated with underimmunization. Detailed datasets available from the U.S. Census Bureau contain direct, small-area population estimates of many of these variables. When coupled with geographic information systems (GIS), surrogate measures provide a powerful visual display of quantitative information (Figure 1).³⁵ The advantage of surrogate measures is that necessary information is readily available at the state level, making them inexpensive and easy to use. The primary disadvantages are that these measures do not provide direct measures of coverage and cannot be used as a diagnostic tool. In an environment of limited funding, however, surrogate measures are

commonly used as a screening tool to identify pockets of need despite these significant disadvantages.

Another method for identifying pockets of need is the school-enterer survey. School-enterer surveys determine, retrospectively, immunization status at age two based upon a review of immunization histories collected by schools as part of the annual student registration process. Using school immunization records of first grader enterers in Minnesota, Murphy et al were able to estimate immunization coverage within two percentage points of actual coverage.³⁶ The primary advantage of school-enterer surveys is that they provide direct measures of immunization coverage, using available data collected by all schools. Other advantages include the modest marginal cost, the level of detail, and the inclusion of children without regular immunization providers. Disadvantages include (1) the time lag between data collection and vaccination (2-5 years), (2) potential changes in residences between vaccination and school entrance, and (3) possible variations in data quality and completeness across schools.

Immunization registries are a fourth method useful in identifying pockets of need. Registries are computerized databases that consolidate immunization history information for children.³⁷ Public health department clinics have been among the earliest users of these registries. Operated at the community- or state-level, registries make a child's current immunization status available to all participating providers working within the registry catchment area. Immunization registries have a number of advantages, including the real-time immunization information they provide and their potential to overcome the information gap barrier to timely immunization and to facilitate interventions (such as reminder/recall and provider-based coverage assessment) known to raise immunization

coverage levels. Important disadvantages include the cost of setting up and maintaining immunization registries³⁸ and low participation among private providers.³⁹ A recent review of registry development in the US revealed that approximately 32% of estimated target children aged 0-5 years were had at least two vaccine doses entered into the registry, suggesting that data completeness is currently suboptimal.³⁹

A fifth method for identifying pockets of need, provider-based assessments, involves conducting chart reviews on a random sample of charts of two-year-old children. These assessments may be carried out in public or private settings. The main advantage of provider-based assessments is that they provide a direct, reproducible measure of immunization coverage. In addition, these assessments are effective interventions that raise awareness of immunization coverage levels and immunization practices among providers. The disadvantages are the time involved, the difficulty of drawing a random sample, and the fact that this method may not capture complete immunization history information for children who have had multiple providers.

Finally, other methods, such as household cluster surveys, random-digit-dial surveys, and birth certificate surveys, provide direct, reproducible measures of immunization coverage and could theoretically be conducted by immunization programs to identify pockets of need. The obvious disadvantage is that such surveys are labor-intensive and too expensive to be used on a routine basis.

Interventions in pockets of need

There are many evidence-based interventions to raise immunization coverage, and reviews of these interventions have been conducted.^{40 41} A comprehensive review was conducted by The Task Force for Community Preventive Services, a 15-member,

independent non-federal committee charged with developing the *Guide to Community Preventive Services*, which makes specific recommendations on selected preventive interventions, including immunizations. During 1997-8, the Task Force conducted a structured review of the scientific evidence regarding interventions to raise immunization coverage levels.^{42 43} The reader is referred to this paper for a review of 197 intervention studies and to www.thecommunityguide.org for accompanying evidence tables.

Based on this review, the Task Force issued recommendations relevant to immunization programs and providers.⁴⁴ Interventions found to be effective in underserved and impoverished settings included WIC interventions, reminder/recall, Assessment, Feedback, Incentives, eXchange of information (AFIX), enhanced outreach, and reduction of out of pocket costs.

WIC interventions. Serving more than 45% of the US birth cohort, WIC represents the single largest point of access to the health care system for low-income preschool children. WIC intervention strategies include assessment of immunization status and referral of underimmunized children to an immunization provider. In addition, parental education, vaccinations on site, and incentives to encourage vaccination may be provided. WIC interventions have been shown to result in increased immunization coverage among impoverished, predominantly minority children. Challenges to implementing WIC interventions include the high personnel costs and difficulties coordinating the efforts and priorities of two separate government programs. Additionally, there is little collocation of WIC sites with private immunization sites, where the majority of US preschool children are immunized.⁴⁵

Reminder/recall. The purpose of client reminder/recall interventions is to increase parental knowledge of their children's immunization status. Reminders or recalls are mailed or communicated by telephone to let patients know when vaccinations are due or overdue. Operating a reminder/recall system requires providers to be continuously aware of the immunization needs of all children for whom they provide care. Many studies have demonstrated the effectiveness of reminder/recall in different populations and settings: children; adults; various racial groups; urban and rural settings; and poor and non-poor patient populations. Challenges to implementing reminder/recall include the administrative burden for providers and office staff as well as the need for an information infrastructure.

Assessment, Feedback, Incentives, eXchange of Information (AFIX). This provider-based intervention involves four main components: (1) conducting practice-level assessments of immunization coverage, (2) sharing results and other feedback with providers in the practice, (3) providing incentives for practices with lower coverage levels and recognition for high performers, and (4) facilitating an exchange of information among practices to encourage benchmarking. This intervention may also be implemented with only the first two components. AFIX is effective among widely varied provider types and facility sites, both public and private. As with reminder/recall, the administrative burden on office staff and need for an information infrastructure present important challenges to implementation. In addition, public health staff trained to carry out assessments in private provider offices may find some providers reluctant to share patient charts.

Notably, AFDX serves as a monitoring tool as well as an intervention. It produces estimates of immunization coverage (provider-based) that may be used to evaluate its own effectiveness as an intervention. As costs continue to constrain programmatic activities, this type of self-measuring intervention becomes increasingly important.

Enhanced outreach. A fourth intervention is the use of enhanced outreach. Enhanced outreach is typically targeted toward populations that are difficult to reach, such as children living in public housing.² Contact may be made via telephone, mail, or in-person visit, and services provided include education, needs assessment, referral, and/or administration of vaccines. Although enhanced outreach has been effective in improving immunization coverage in high-risk settings, the cost of this intervention is high. Two studies recently reported cost-effectiveness ratios ranging from \$513-\$13,020 per additional vaccination. In the current environment of limited resources, enhanced outreach that includes services in addition to immunization may be more cost-effective.

Reduction of out of pocket costs. A fifth intervention, especially relevant to children living in pockets of need, involves reducing out of pocket cost to families by paying for vaccines and their administration, providing insurance coverage, and reducing or eliminating copayments for vaccination. The federal government, state governments, and managed care organizations have been the primary groups to implement this type of intervention. For its part, the federal government created the Vaccines for Children (VFC) Program in 1994.⁴⁶ This entitlement program is operated by a partnership between individual states and the federal government. VFC provides public purchased vaccines to all enrolled providers (private or public) to immunize three groups of children: American Indians/Alaska Natives, Medicaid enrollees, and the uninsured. A

number of studies have documented the effectiveness of this intervention.^{47 48 49} Children who are underinsured with respect to immunizations may also receive VFC vaccine when seen at Federally Qualified Health Centers (FQHC) or Rural Health Clinics (RHC). Since less than 5% of preschool children receive all their immunizations at these sites,⁴⁵ it is unlikely that VFC sufficiently addresses the needs of the underinsured. Consequently, states may chose to address the problem of underinsurance for immunizations by promoting first dollar coverage laws that require insurers to cover the cost of all recommended childhood vaccinations⁵⁰ or using state dollars to provide public-purchased vaccine to underinsured children in settings other than FQHC and RHC (for more information on the Vaccines for Children Program and state vaccine supply policies see www.cdc.gov/nip/vfc/about.htm).

Evaluation of progress or impact in pockets of need

Given the important role that pockets of need may play in the spread of vaccine-preventable diseases and the substantial amount of resources required to identify and intervene in these areas, evaluation of the impact of efforts to improve coverage in pocket of need is essential. The following are examples of methods that may be used to monitor progress in pockets of need.

Self-measuring interventions such as AFIX may be used to evaluate changes in immunization coverage in pockets of need because they provide outcome information that can be measured repeatedly. Limitations to using AFIX as an evaluation method are similar to those that arise when AFIX is used to identify pockets of need.

Immunization registries may also assist in the evaluation of interventions in pockets of need. By providing current immunization information about all children living in a

designated area, registries can help to overcome the information gap, which poses a barrier to the measurement of immunization coverage as well as to the delivery of immunizations. The potential for immunization registries to support evaluations of this type has not yet been realized since many pockets of need are not yet included in fully functioning immunization registries.

Other outcome-based methods to consider as evaluation tools include household cluster surveys and school-enterer surveys. Household cluster surveys, conducted both at baseline and following the intervention, are theoretically an ideal evaluation method. However, because they require so many resources, these surveys are generally reserved for special circumstances in which it is necessary to confirm concerns raised by another identification or evaluation method. School-enterer surveys, while they provide small area estimates of coverage useful in identifying pockets of need, have a significant time lag, which limits their utility in evaluating local interventions.

Where outcome measures cannot be collected, process measures (e.g., the proportion of providers who have participated in AFIX or are enrolled in the VFC Program) provide some indirect information about success in implementing interventions in pockets of need.

CDC policy, practice, and grant guidance

Since 1963, the CDC has implemented the 317 grant program, which refers to Section 317 of the Public Health Service Act. This program currently funds 64 immunization grantees including 50 states, the District of Columbia, five large urban areas, and 8

current and former territories. The funding enables grantees to purchase vaccines and helps assure that other core functions of an immunization program are implemented.

During the 1980s, CDC guidance to immunization grantees focused upon implementing school entrance laws to address the problem of underimmunization. Grant guidance emphasized targeting high-risk areas and recommended grantees schedule "special immunization clinics in defined geographic areas in population groups of particularly high susceptibility." The term "pockets of need," however, and the specific directives to immunization grantees that would accompany it, did not arise until more than a decade later.

Addressing the 1989-1991 measles epidemic was a major task for the public health community. Public health policymakers focused on lessons learned from this epidemic, including the importance of preschool children and of certain large urban underserved areas in the spread of disease. The epidemic provided an important "wake-up call" for public health officials and had a significant impact upon policies to guide immunization grantees.

In 1997, the CDC began to provide more specific guidance (and subsequent requirements) to immunization grantees on identifying and addressing pockets of need. In that year, immunization grantees were required to develop plans that identified pockets of need within their jurisdictions and proposed activities to identify and vaccinate children in these areas.

Acknowledging both high national coverage levels and the risk posed by groups of underimmunized children in pockets of need, CDC grant guidance called for a three-pronged approach from immunization grantees: "(1) identifying defined geographic

areas where subpopulations at high risk of underimmunization reside, (2) measuring immunization coverage in these areas, and (3) implementing measures designed to achieve high coverage among the high risk groups in these areas.” The guidance included examples of methods to identify areas of increased need, using both direct and surrogate measures. Finally, examples of strategies to increase immunization coverage, such as WIC linkage, AFIX, reminder/recall systems, and immunization registries, were described in significant detail.

Detailed guidance about implementing these interventions was also provided. For each pocket of need identified, grantees were to develop an inventory of all immunization providers (both public and private) and the immunization interventions that these providers were currently implementing. Following this process, grantees were expected to work with all identified providers to assist in the implementation of recommended immunization strategies by providing technical assistance as well as redirecting resources and personnel. Finally, grantees were asked to track process measures (e.g., the number of providers, the types of interventions being implemented by these providers, and the numbers of children being reached) as well as estimates of immunization coverage levels in these areas. Community-based immunization coverage levels, the optimal outcome measure, could be replaced by provider-based coverage levels if necessary.

Activities of the Immunization Grantees

Annual Progress Report

Immunization grantees are required to complete an annual progress report for submission to CDC. In 1998, there were four main categories of questions related to pockets of need:

(1) measures used to identify pockets of need, (2) information collected about key interventions (WIC, reminder/recall, AFLX) and the use of additional interventions, (3) methods to monitor and measure coverage in these areas, and (4) redirection of resources to pockets of need activities. The following is a summary of grantee responses to pockets of need questions in 1998.

Of the 64 grantees, 63 submitted a report in 1998. All current and former territorial island groups except Puerto Rico were excluded from this analysis because of their unique geographic characteristics and small size. The final sample was comprised of 57 grantees.

Identification

Grantees were asked about surrogate measures used to identify pockets of need. Figure 1 illustrates the most commonly reported surrogate measures. The two most commonly reported measures were population density and proportion of the population living below poverty level. Twenty-six respondents wrote in other identification methods, which included both combinations of surrogate measures, as well as direct measures of coverage. In addition, 13 grantees indicated they analyzed surrogate measure data with GIS to identify pockets of need.

Grantees were asked about existing registries and 37 reported a functioning registry that included at least some providers in pockets of need. No information was requested about how grantees were using registries in pockets of need activities.

Interventions

Grantees were asked to report about interventions they implemented, as well as interventions on which they collected information. In terms of interventions

implemented, the use of increased clinic hours (n=34), and the use of additional sites (n=34) were commonly reported public clinic strategies to enhance immunization delivery in pockets of need. Other commonly reported programmatic interventions included: provider education (n=49), public education (n=42), community coalitions (n=38), and community awareness campaigns (n=35). Finally, 33 grantees reported that VFC promotion and enrollment of physicians were prioritized in pockets of need.

Grantees were also asked to describe the information they collected about ongoing WIC, reminder/recall, and AFIX interventions. The majority of grantees reported collecting information about WIC interventions (n=34), reminder/recall (n=42 in the public sector, n=21 in the private sector), and AFIX (n=48 in the public sector, n=40 in the private sector).

Evaluation

Grantees were asked about methods used to monitor coverage in pockets of need. In terms of provider-based methods, 54 grantees reported conducting assessments in public clinics, 43 in private provider practices, and 16 in managed care organizations. Figure 2 shows the number of grantees who reported using selected population-based methods. Retrospective school surveys were the most frequently reported evaluation method. Regardless of method, 49 grantees reported measuring immunization coverage levels at least annually.

Redirecting resources

Nearly half of all grantees reported redirecting at least part of a full time equivalent (FTE) to work on pockets of need activities, and 30 grantees reported the redirection of funds to support pockets of need activities. The most common programmatic areas to

which funds or personnel were redirected were provider assessments, outreach activities, registries, and reminder/recall. Compared to grantees who did not report a redirection of resources (n=19), grantees reporting redirection of resources (n=38) were more likely to report prioritization of VFC promotion and enrollment of physicians, use of population-based methods to monitor coverage, and collection of information about interventions in the private sector.

Annual report data have important limitations. First, the data are self-reported, and grantee responses were not verified by CDC staff. Of note, grantees completing the annual report were submitting answers to the agency responsible for funding their programs. Second, the annual report is a program evaluation template; it was not designed to be a research tool. As such, efforts were not made to pilot and refine questions prior to distribution. Finally, responses to the annual report represent a single, cross-sectional view of a continually evolving program.

Discussion

In this report, we have provided background information about pockets of need and barriers to the immunization of preschool children. We have outlined CDC's recommended three-pronged approach for addressing pockets of need and have discussed methods for carrying out this approach as well as some of the challenges inherent in using these methods. Finally, we have described the evolution of CDC policy regarding pockets of need and summarized programmatic information about pocket of needs activities reported by immunization grantees in 1998.

Remaining work

The immunization delivery environment in the US is changing rapidly. During the last decade, the system has become largely privatized due to vaccine financing changes and the rise of managed care and Medicaid managed care. In addition, new, expensive vaccines continue to be added to an already complicated, full immunization schedule. Under these circumstances, assuring timely vaccination for the most vulnerable children will remain particularly challenging.

Given this changing environment, the role of public health is gradually shifting from the direct provision of services to accountability for immunizations delivered largely in the private sector.⁵¹ This broadened accountability requires public health agencies to forge alliances with new partners. Together, public health staff and their partners will need to develop, measure, and adhere to community level indicators of immunization delivery.⁵² In many communities, expanded public health oversight authority may be necessary. In addition, public health will need to develop new ways of doing business, such as working with health care purchasers to negotiate managed care contracts (for more information on sample purchasing specifications see www.gwu.edu/~chsrf/sps/).

Improving immunization coverage in pockets of need will require substantial resources. Children in these areas are difficult to reach and have access to fewer health care providers and sites. To best serve these children, immunization resources must be redirected and concentrated in areas of greatest need. Not surprisingly, there is a role for new knowledge in guiding this shift in resources. For example, it would be helpful to understand factors that enable one high-risk community to achieve high immunization coverage levels, while similar communities do not.

Finally, protecting all US children from vaccine-preventable diseases requires the development of an infrastructure to assure immunizations day in and day out, even when the incidence of those diseases, and therefore political interest, is low. A consensus statement issued by the National Vaccine Advisory Committee (NVAC) in 1999 describes a broad vision for this infrastructure.⁵⁰ This statement makes 15 specific recommendations in four key areas: financing, provider practices, monitoring, and support for communities and families. The majority of these recommendations are particularly relevant to pockets of need.

Each day, 11,000 babies are born in the United States. Although only a small proportion of these children live in pockets of need, the epidemiology of vaccine-preventable diseases is such that assuring optimal protection for the US birth cohort requires timely and complete immunization of children in these areas. Continued, intensive efforts are needed to assure vaccination of all US preschool children with our current, powerful, and ever-expanding armamentarium of childhood vaccines.

Table 1. Barriers to immunization among US preschool children.

Factors whose association with underimmunization is not supported by strong evidence

- Parental attitudes
- Provider attitudes
- Ability to identify a primary care provider

Factors whose association with underimmunization is supported by strong evidence

- Socioeconomic factors *poverty, cost to families, cost to providers*
- Utilization of services
- Parental knowledge
- Failure to implement recommended interventions *reminder/recall, practice-based coverage assessments*
- Missed opportunities

Figure 1. Map identifying pockets of need using geographic information system (GIS) software.

Figure 2. Most common surrogate measures reported by grantees to identify pockets of need, 1998.

Figure 3. Most common population-based methods used by grantees to monitor coverage in pockets of need, 1998.

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1997 IMMUNIZATION GRANTEE ANNUAL PROGRESS REPORT RESULTS

SUMMARY: POCKETS OF NEED

INTRODUCTION

The FY 1996 Senate Appropriations Committee Report directed CDC to develop and implement a strategy to identify pockets of under-immunized children and target resources to raising immunization coverage in those areas. A "pocket of need" (PON) is defined as an area or population with low immunization coverage, a large number of unvaccinated children and high-potential for vaccine-preventable disease outbreaks. Since most vaccine-preventable diseases are spread from person to person, risk of disease outbreaks is often greatest where clusters of unvaccinated or under-vaccinated children reside, a situation prevalent in crowded conditions of many inner cities.

To sustain and further reduce low vaccine-preventable disease incidence, the 1997 grant guidance instructed grantees to place additional emphasis on: (1) identifying defined geographic areas where sub-populations at high risk for under-immunization reside (2) measuring immunization coverage in those areas, and (3) implementing measures designed to achieve high coverage among the high-risk groups in these areas. These geographical subdivisions may consist of groupings of census tracts, distinct communities or Health Provider Shortage Areas (HPSAs).

In 1997, grantees intensified efforts to identify PONs using a variety of survey data and various surrogate measures of immunization coverage. When data from surveys were not available, grantees used demographic, sociological and/or epidemiological surrogate measurements including, but not limited to, one or more of the following: high proportion of racial and ethnic minority subpopulations, high poverty level, low educational status of parents, high population density and/or high incidence of vaccine-preventable disease. Grantees also reported on efforts to measure and monitor immunization coverage in identified PONs. Provider-based assessments, community-based household cluster surveys, random household telephone surveys, or follow-back birth certificate surveys are among the methods used to assess immunization coverage in these areas.

Available data suggest that three strategies are likely to increase immunization coverage and to build a system that will sustain those improvements. These strategies are linkages between the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) and immunization services; assessment of immunization coverage levels and practices in public and private provider settings with feedback of results to individual providers (AFIX); and reminder/recall systems. NIP encouraged grantees to ensure that these key strategies are fully implemented in PONs. Therefore, grantees were asked to report on their activities to measure and monitor progress in implementing these key strategies in the PONs that they identified. In addition to WIC linkage, reminder/recall systems, and AFIX, grantees were also asked about progress in implementing immunization registries in PONs and other initiatives they may have implemented.

The following information on PONs, obtained from the 1997 Annual Progress Reports, is based on responses from 58 grantees.

1997 ANNUAL REPORT DATA:

Grantees were required to report no later than March 31, 1998, the status of their efforts during 1997 to address areas at greatest risk for under-vaccination or pockets of need (PONs). Grantees were provided a report template that covered five operational aspects: (1) identifying PONs; (2) monitoring immunization coverage in identified PONs; (3) monitoring progress in implementing key strategies in PONs; (4) identification/immunization of undervaccinated infants/children in PONs; and (5) targeting resources to implement activities in identified PONs. A copy of the PONs portion of the report template is attached. This was the first year that data on PONs were collected in a way that could be quantified. In prior years, grantees had been required to report information in a narrative format. Therefore, it is not possible to make comparisons to previous years in this report.

1. IDENTIFYING PONs

Surrogate measures used to identify PONs

Studies have demonstrated that low socioeconomic status is associated strongly with underimmunization. The association of low socioeconomic status with crowded living conditions, low parental educational level, large family size, young parental age and late start for immunizations suggests that a significant portion of urban populations are at increased risk of vaccine-preventable diseases. Therefore, grantees were asked which surrogate measures they used to identify PONs. As shown on the table below, the most widely used surrogate measures for identifying PONs were: (1) the proportion of minorities (43.1%) and (2) population density (36.2%). Grantees also reported using the proportion of the population at or below a certain percent of poverty (32.8%), provider/service shortage (29.3%), proportion of single parent households (22.4%), proportion of heads of household with less than 12 years of education (20.7%), proportion of households receiving public assistance (17.2%), and vaccine-preventable disease morbidity (15.5%). Since more than one measure could be reported, the sum of the individual proportions exceeds 100 percent. Of the 19 grantees reporting use of proportion of poverty level, 6 grantees used 100% of poverty, 4 used 200%, 3 used 185%, 2 used 150%, and 1 each used 149% and 250%.

Proportion of minorities	25 (43.1%)
Population density	21 (36.2%)
Proportion of population at or below a certain percent of the poverty level	19 (32.8%)
Provider/service shortage	17 (29.3%)
Proportion of single parent households	13 (22.4%)
Proportion of heads of household with less than 12 years of education or GED	12 (20.7%)
Proportion of households receiving public assistance	10 (17.2%)
Vaccine-preventable disease morbidity	9 (15.5%)

Direct measures used to identify PONs

Direct measurement methods used to identify PONs were also reported by grantees. Again, grantees could choose more than one response so proportions will sum to greater than 100 percent. As shown in the chart below, half (50%) of grantees reported using retrospective surveys to identify PONs. Fewer grantees reported use of provider-based surveys (36.2%), local immunization registries (34.5%), cluster surveys (20.7%), birth certificate-based surveys (19%), statewide immunization registries (19%), and random digit dialing surveys (10.3%).

Retrospective surveys	29 (50%)
Provider-based surveys	21 (36.2%)
Local immunization registries	20 (34.5%)
Cluster surveys	12 (20.7%)
Birth certificate-based surveys	11 (19%)
Statewide immunization registries	11 (19%)
Random digit dialing surveys	6 (10.3%)

Use of geographic information systems (GIS) to identify PONs

Use of geographic information system (GIS) computer software to identify and map PONs was reported by slightly over one-fifth of grantees (22.4%). Information was not collected on the types of data being entered into the geographic information systems.

Identification of specific PONs

Grantees were asked to list and provide geographic descriptions of individual PONs identified. The remainder of the discussion refers ONLY to information provided about the specific PONs listed by the grantees.

2. MONITORING IMMUNIZATION COVERAGE IN IDENTIFIED PONs

Grantees were asked to report on their efforts to measure and monitor immunization coverage in the PONs they had identified.

Population-based methods used to monitor coverage

First, grantees were asked to report on population-based methods used to measure and monitor coverage in PONs. The most frequently reported method was retrospective school-based surveys (50%). Other population-based methods were reported much less frequently. This is to be expected because population-based methods are time consuming and very expensive. Few grantees reported use of birth certificate surveys (15.5%), cluster surveys (13.8%), or random digit dialing surveys (10.3%). More than one response could be selected by grantees.

Provider assessments used to monitor coverage

Grantees were also asked to report use of provider assessments to measure coverage in identified PONs. Public clinic assessments (87.9%) were most widely reported by grantees and were followed by private provider assessments (62.1%). Relatively few grantees reported use of managed care plan assessments (29.3%). More than one response could be selected by grantees.

Public clinic	51 (87.9%)
Private provider	36 (62.1%)
Managed care plan	17 (29.3%)

Frequency of measurement of immunization coverage

Grantees reported the frequency with which they measured immunization coverage in identified PONs. The majority (69%) reported annual assessments, followed by biennial assessments (15.5%) and semi-annual assessments (10.3%). American Samoa, Arizona, Chicago, Indiana, Nevada, New Mexico, North Carolina, Rhode Island, and Texas reported only biennial assessments of immunization coverage in identified PONs.

3. MONITORING PROGRESS IN IMPLEMENTING KEY STRATEGIES

Information on WIC linkages in identified PONs

Grantees were asked about the types of information they collected on WIC linkage in the identified PONs. Equal numbers of grantees (72.4%) indicated that they collected information on the number of WIC sites in PONs and the number of target WIC sites with enhanced assessment and referral. Information on the number of target WIC sites implementing high-risk protocols for immunization was collected by 19% of grantees, including Arkansas, California, Chicago, Georgia, Houston, Michigan, Missouri, Nevada, North Carolina, South Carolina, and Tennessee. More than one response could be selected by grantees.

Information on reminder/recall systems in identified PONs

Over the past 20 years, studies of the effectiveness of manually generated mail or telephone appointment reminder/recall systems have consistently shown significant improvements in patient compliance for a variety of scheduled health visits. Therefore, grantees were asked about the information collected on reminder/recall systems in PONs. Slightly over three-quarters of grantees (75.9%) collected information on the number of public provider sites with reminder/recall systems. Fewer grantees (24.1%) collected information on the number of private provider sites with reminder/recall systems. Equal numbers of grantees (25.9%) collected information on the number of sites with letter-only reminder/recall systems and the number of sites with telephone callback reminder/recall systems. Chicago, Delaware, the District of Columbia, Hawaii, Mississippi, Palau, American Samoa, and South Dakota (13.8%), however, reported that they did not collect any of the above information on reminder/recall systems in identified PONs.

Information on AFIX in identified PONs

Grantees were asked to report on the types of information collected on AFIX in identified PONs. Grantees indicated that they collected information on the number of public/private providers assessed during the grant year (74.1%) and number of public/private providers re-assessed during the grant year (36.2%). However, only 51.7% of grantees indicated that they collected information on the total number of public/private providers located in the identified PONs. Grantees who do not have information on the total number of public/private providers located in the PONs will not have the denominator necessary for determining what percent of the total number of providers are being assessed or reassessed

each year. Alabama, Connecticut, Georgia, Houston, Idaho, Illinois, Iowa, Kentucky, Michigan, New Hampshire, New York State, Ohio, Palau, American Samoa, and Virginia are the grantees which do not collect this information. Information on the number of WIC sites assessed during the grant year was collected by 58.6% of grantees.

Information on immunization registries in identified PONs

Slightly over half of grantees (55.2%) indicated that an immunization registry was operational in any of the identified PONs in 1997. Of those grantees reporting an operational registry, 62.5% indicated that during 1997 they had linked additional provider sites in the PONs to the registry.

4. IDENTIFICATION/IMMUNIZATION OF UNDERVACCINATED INFANTS/CHILDREN

Identification of individual under-vaccinated infants/children in identified PONs

Grantees were asked to report on activities undertaken in 1997 to identify and immunize undervaccinated infants and young children in the identified PONs. Grantees reported using public provider assessments (including community and migrant health centers or C/MHC) (79.3%), private provider assessments (60.3%), electronic immunization registry or registries (56.9%), and manual tracking systems/tickler files (53.5%). In addition, 15.5% of grantees reported using some other mechanism for identifying these children.

Public provider assessments	46 (79.3%)
Private provider assessments	35 (60.3%)
Electronic immunization registry	33 (56.9%)
Manual tracking systems	31 (53.5%)
Other mechanism	9 (15.5%)

Enhancement or intensification of programmatic strategies in identified PONs

A number of programmatic strategies were being enhanced or intensified in identified PONs, including outreach (82.8%), provider education (75.9%), WIC linkage (79.3%), AFIX (67.2%), implementation of effective reminder/recall (60.3%), and linkage with other public assistance programs (36.2%). Slightly over half (51.7%) of grantees reported other programmatic strategies not listed were being enhanced or intensified in identified PONs. Grantees who reported enhancement or intensification of outreach and AFIX were asked for more specific information about activities in those categories. Those grantees who reported

that outreach mechanisms were being enhanced or intensified in PONs reported the following specific activities: public education (100%), community awareness campaigns (91.7%), coalition building (85.4%), use of volunteers (60.4%), door-to-door canvassing (43.8%), and involvement of community-based organizations (CBOs) to contact families of individual children identified as undervaccinated (35.4%). Grantees who reported enhancement or intensification of AFIX were also asked about each specific component. Those grantees reported enhancement or intensification of Assessment (100%), Feedback (94.9%), eXchange (76.9%), and Incentives (71.8%).

Outreach	48 (82.8%)
Provider education	44 (75.9%)
WIC linkage	46 (79.3%)
AFIX	39 (67.2%)
Reminder/recall	35 (60.3%)
Linkage with other public assistance programs	21 (36.2%)
Other strategies not listed	30 (51.7%)

Enhancement or intensification of delivery of immunization services in identified PONs

Grantees also reported on their use of a number of methods to enhance or intensify delivery of immunization services in identified PONs. Methods reported included increased clinic hours (51.7%), additional clinic sites (44.8%), and use of mobile clinics (44.8%).

Prioritization of VFC promotion and/or enrollment of physicians

Half of grantees reported that VFC promotion and/or enrollment of physicians were being prioritized in identified PONs.

Enhancement or intensification of community and provider outreach activities

Thirty-four of the 58 grantees (58.6%) reported that community coalitions had been formed in their target areas. Those grantees reporting that a community coalition had been formed reported that coalition activities were focused on public education (94.1%), provider education (73.5%), reaching the medically underserved population (61.8%) and home visits for reminder/recall activities (29.4%).

5. TARGETING OF RESOURCES TO IMPLEMENT ACTIVITIES IN IDENTIFIED PONs

Finally, grantees were asked to report on the efforts undertaken to target resources to implement activities in the identified PONs.

Redirection of personnel time to work on PON issues

Slightly over two-thirds (67.2%) of grantees reported that personnel time had been redirected to work on PON issues.

Redirection and targeting of funds to identified PONs

Over half (55.2%) of grantees reported that funds had been redirected and targeted to identified PONs. Those grantees which reported that funds had been redirected further were asked to identify the program areas in which funds had been increased. Grantees reported that they increased funds in PONs for patient tracking (reminder/recall) (62.5%), WIC linkage (62.5%), provider assessments (53.1%), service delivery (43.8%), registry development (40.6%), and C/MHC- related projects (28.1%).

Conclusions

In general, grantees are making progress in implementing the PONs approach, particularly in identifying PONs. Idaho, Montana, Northern Mariana Islands, Palau, Texas, Vermont, and Wyoming, however, did not identify PONs. Several of those grantees stated that because of their low population density they had not tried to identify PONs. Texas was in the process of completing a survey to identify PONs.

Use of direct measures to identify PONs is not practical and not encouraged due to excessive cost. With the exception of retrospective school surveys, few grantees reported use of any particular type of population-based measure of coverage to identify PONs. In addition, grantees used a variety of surrogate measures to identify PONs. Relatively few grantees, however, used GIS in the identification process. GIS have become cheaper and more user-friendly in recent years and grantees might find them helpful in conjunction with either direct or surrogate measures to visualize PONs.

Most grantees are using provider assessments to monitor coverage in identified PONs. However, while a majority of grantees reported public clinic and private provider assessments, relatively few reported managed care plan assessments. Assessment of coverage in managed care plans could become increasingly important as more children become covered by those plans.

About three quarters of grantees are collecting information on implementation of key strategies (WIC, reminder/recall, and AFIX). Only 11 grantees (19%) reported collection of information on the number of target WIC sites implementing high-risk protocols for

immunization, an important strategy that NIP continues to promote. Information on implementation of key strategies in PONs should be collected by almost all grantees. NIP must continually emphasize the importance of this information for ongoing programmatic evaluations as part of routine program management.