

**ESTIMATING THE NEED FOR PUBLICLY PURCHASED  
VACCINE FOR ADULTS AND CHILDREN**

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**Background Paper  
Prepared for the Committee on the Evaluation of  
Vaccine Purchase Financing in the United States**

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**Revised – September 27, 2003**

## I. Introduction

The purpose of this paper is to accurately estimate the number of children and adults that need or qualify for *publicly purchased vaccines*. People qualify or can obtain publicly purchased vaccines by:

- a) Being eligible for the Vaccines For Children program; or
- b) Residing in a ‘Universal Purchase’ state; or
- c) Presenting to a public health clinic and requesting immunizations, at which one will get:
  - a. VFC vaccination if eligible or
  - b. Vaccine purchased with Section 317 if not eligible for VFC.

This paper will describe an approach to estimating the number and costs of specific vaccinations that should be publicly purchased on a national level. To do this I first outline the vaccinations needed by specific age or clinical condition groups. Second, I estimate the overall size of the populations that need or qualify for specific vaccinations. Third, I estimate the number that are indigent or qualify for publicly purchased vaccines within each of these populations.

**Vaccination Schedule.** The recommended immunization schedule for children and adults is determined for children jointly by the ACIP, the AAP and the AAFP. The child schedule changes frequently, and is published every January and July in Pediatrics and the MMWR. The schedule for adult immunizations does not change as frequently and is published in the MMWR as changes are promoted. One or more of the following characteristics determines the universe of people who need vaccinations each year;

- Age (e.g., infants require the infant immunization series, the elderly should receive annual influenza vaccination, etc.),
- Immunization status or immunizations already received (e.g., adolescents who have not yet had Hepatitis B should receive it; elderly that have already had pneumococcal vaccination do not need it again, etc.)
- Medical condition or specific behaviors or characteristics that put them at high risk for contracting a specific vaccine preventable disease (e.g., annual influenza is indicated for persons 18 months to 64 years who have cardiac and pulmonary or immunologic diseases but not for health persons in this age group; persons with multiple sex partners should receive hepatitis b and A, etc.).

Assuming that they receive the vaccinations according to the appropriate schedule, all children during the first five years of life are recommended to receive 5 DTaP (Diphtheria, Tetanus and acellular Pertusis), 4 IPV (inactivated polio vaccine), 2 MMR (measles, mumps and rubella), 3 Hepatitis B vaccinations, 4 *Haemophilus Influenza B* vaccinations, 4 Pneumococcal conjugate vaccinations (Prevnar), and one Varicella (chicken pox) vaccination.

Another way of identifying and describing populations for whom publicly purchased vaccinations are intended is by the different federal and state vaccine purchase programs. These programs are:

- The Vaccines for Children Program,
- The Section 317 program (a program run by the CDC that awards dollars to states to purchase and deliver immunizations through local PHDs) and,

- Vaccines purchased by states with state funds to either augment the VFC program or to purchase vaccinations for all children in their state (entitled state Universal Purchase programs, which include only child vaccination).

I will estimate the projected sizes of the populations served by the above vaccine financing programs by estimating the number of eligible people in the age and medical condition groups that meet the eligibility criteria for each of the programs. I specifically eliminate from the estimate the people (and specific vaccines) purchased with private insurance, public insurance SCHIP programs separate from Medicaid (they are treated like private insurance coverage) or Medicare.

This paper will estimate the number of persons that fall into one of the following categories listed separately for children and adults (I also list the source of public funds potentially or directly responsible for covering the particular group):

**Children.** The groups of children that may require publicly purchased vaccination include (the program covering these children is in parentheses):

- Uninsured children (VFC and 317)
- Children on Medicaid or SCHIP expansions of Medicaid. (VFC)
- Native American/American Indians (VFC)
- Children with private insurance that are “underinsured” for immunizations because either:
  - Their private health insurance does not cover immunizations, or
  - Their insurance policy has deductibles and co-pays sufficiently high relative to family/personal income to be a barrier to receipt of immunizations.

Caveats:

- In “VFC-only” states the “underinsured” may receive immunizations at Federally Qualified Health Centers (FQHCs) or PHDs. However, few utilize the FQHC option due geographic, knowledge or other barriers. (Communication, Jeannie Santoli, 8/23/02)
- In “VFC+” or “UP” states the “underinsured” can receive state purchased vaccine at their private doctors’ offices or at PHD
- Using Section 317 funds Public Health Departments purchase vaccinations intended for children not eligible for VFC, including undocumented children, underinsured children in VFC-only states, or to insured children that go to the PHD for non-financial reasons.

For this analysis I will assume that all adolescents have received the vaccines required prior to school entry and therefore none of the routinely recommended vaccinations will be estimated for this age group. The vaccines required at school entry include all those required in adolescence if not already received including; second MMR and the Hepatitis B series. Because the Hepatitis B series and the second MMR were added to most states’ immunization school entry requirements almost 10 years ago, most children now 12-13 were vaccinated before entering school. Lastly, school retrospective surveys demonstrate that the school entry laws have been very effective at achieving almost 100% coverage of children by school entry. This allows me to limit my estimates for the different vaccine payment programs to children 0-5.

**Adults.** The primary adult vaccinations are annual influenza vaccination (annually for specific groups described below), pneumococcal vaccination one time in adulthood and a tetanus booster (Td) every 10 years. The following groups are eligible for influenza, pneumococcal vaccines and the tetanus (Td) booster:

- For Td all adults (every 10 years)
- For influenza vaccine;
  - All adults 50-64 years of age, and
  - Adults 18-49 with a chronic cardio/pulmonary condition
- Pneumococcal vaccine is recommended once in a lifetime for the following groups;
  - All adults 50-64
  - Adults 18-49 with a chronic cardio/pulmonary condition

Pneumococcal and influenza vaccinations are covered by Medicare, so no adults 65 and over will be included in my estimates. However, Medicare does not cover Td vaccination, *so adults 65 and over will be included in the estimates for Td vaccination.*

**Estimating number of vaccines and total costs.** Based on the number of persons in each group, their age distribution, and specific vaccine indications, I estimate the number of each of the childhood and adult vaccines that would need to be publicly purchased each year, assuming a static population size. I will also estimate the total cost of purchasing these vaccinations based on current CDC contract pricing. Lastly, in the discussion I will examine trends in public and private health insurance coverage in the US and the potential impact of those trends on projections for publicly purchased vaccinations.

## II. Estimating Insurance Coverage.

There are a number of on-going annual or periodic surveys that measure insurance status of the American public, including the annual Current Population Survey (CPS), the annual National Health Interview Survey (NHIS), the periodic Survey of Income and Program Participation (SIPP). In addition, periodically private foundations, the federal government or other sponsors support surveys that gather more in-depth information on health insurance status and other specialized topics. These surveys include the Medical Expenditure Panel Survey (MEPS) sponsored by the Agency for Healthcare Research and Quality (AHRQ), the Community Tracking Study (CTS) and the National Survey of America's Families (NSAF). In a paper entitled, "Using National Data to Analyze Children's health insurance coverage," John Czajka and Kimball Lewis from Mathematic Policy Research, Inc, clearly and comprehensively compared the different surveys used to measure child and adult health insurance status. The surveys differ in when they are administered, how often and over what time period they are administered and in their definitions or categories of age, insurance and other important issues. (Czajka J, Lewis K, 2001)

**Which insurance coverage measure?** Estimates of the incidence or frequency of uninsurance coverage are reported typically in one of three ways:

- (1) The number or proportion uninsured at a specific point in time,
- (2) The number or proportion ever uninsured during the past year, or
- (3) The number or proportion uninsured for the entire last (or most recent calendar) year. Point-in-time estimates are the most commonly cited.

Of the six surveys, only the SIPP and MEPS are able to provide all three types of estimates. Czajka and colleagues analyzed a panel of children followed through 1992 by the SIPP. They were contacted quarterly to review the past quarter's health insurance status and found that, on average, 13.1 percent were uninsured at any one point during the year; 21.7% of children were ever uninsured during the year; and 6.3% were uninsured for the entire year. (Czajka and Lewis, 1999) The choice of different time-period estimates is often policy or programmatically driven. For example, CMS, when presenting its Medicaid coverage

statistics chooses to present administrative data showing those ever insured under Medicaid (or SCHIP) during the year. Other organizations, including advocacy organizations, cite point-in-time estimates for number covered under Medicaid. The former estimates are always higher than the latter.

It is important to realize that for the purposes of estimating need for publicly purchased vaccine it is not clear which insurance estimate indicator is most appropriate. Being continuously uninsured is certainly worse than being uninsured for only short periods time, however the relationship between immunization receipt and months of being uninsured is not a simple linear relationship. Since immunizations, especially for children, are events that occur throughout the first and second years of life, even short disruptions in insurance, depending upon the timing of the disruption, could have as great an impact on immunization receipt as long periods of uninsurance. Loss of insurance is associated with other potentially more significant problems that affect immunization services, such as family moves or change of child health provider. Therefore, even a short period of being uninsured can knock a family off track and significantly impede the child's receipt of immunizations. Given that a point estimate of being uninsured is "middle ground" measure, it has been most commonly used as an indicator of uninsurance and is the measure I will use in my estimates.

An important characteristic of insurance coverage estimates is that they are a moving target and change constantly, especially for the younger, poor and near poor families, who have higher rates of job change and mobility. A number of studies have examined the frequency of turn over or loss of insurance over a one to two year period of time for children on Medicaid. Insurance loss rates vary greatly by state and are primarily related to state enrollment maintenance policies and procedures, with the more frequent and the more bureaucratic requirements causing higher turnover.(CHIRI, 2002) Fairbrother (2002) reviewed data on continuous enrollment of two year old children in Medicaid managed care plans across a number of states. She found that less than half of children had been covered continuously for at least 6 months prior to their 2<sup>nd</sup> birthday and only 34% had been covered continuously between their 1<sup>st</sup> and 2<sup>nd</sup> birthdays. Studies using the CPS showed that during the period between 1993 and 1996 one third of all children (including those privately as well as publicly insured) lost health insurance with a median length of lack of coverage being 4 months. For adults the proportion that had lost insurance and the months without uninsurance were both much higher. (US Census, 1998). Thus, most children on Medicaid and many children with private insurance loose or change insurance status frequently. This problem is even more common among adults under 65. Therefore, insurance estimates should be viewed as a snap shots of a constantly moving and changing phenomena.

**Which information source?** While the CPS has its limitations, which I will present, it has strengths that make an excellent candidate survey for our purposes. First, it is an annual survey and preliminary results are available rapidly, while the other survey results are not available for at least one to two years. Second, it is the survey used by the Federal Government and many advocacy organizations to monitor health insurance status across the country and therefore estimates would be consistent with the vast majority of health insurance estimates published. Thirdly, it has the age breakdowns and the insurance categories that are most appropriate for our purposes. In fact, to improve the precision of state-based child health insurance estimates, the CPS in 2001 increased its sample size for the Supplement, particularly in states with high sampling errors.

There are a number of important limitations to the health insurance estimates derived from the CPS. The interview requests information about a number of types of health insurance coverage during the last full calendar year (the health insurance supplement occurs in March each year). It measures rates of insurance

over the entire 12-month calendar year, making the CPS insurance estimate a “period estimate” of insurance. However, experts interpret the CPS estimate more as a point estimate, based on studies of recall bias (the longer period of recall the greater the bias) as well as comparisons to the insurance estimates of the other surveys and CMS administrative data on a national and state level. Point estimates of insurance will be lower than period estimates of insurance and therefore generate higher rates of uninsurance. Furthermore, the CPS asks about insurance coverage and derives uninsurance rates by subtracting those with insurance from the total, not by specifically asking about lack of insurance. Due to under-reporting of insurance (which has a greater effect on the upper class insured rates and not much effect on Medicaid rates) the CPS estimates of uninsurance were felt to be too high. To address this problem the CPS included in the 2000 March Insurance supplement an additional question for those who did not acknowledge any type of insurance to confirm that they were uninsured last year. (Nelson and Mills, 2001) This question caused the estimate of the number of uninsured to go from 42.1 million to 39 with new method in 1999 and from 41.9 to 38.4 million in 2000 (Kaiser Commission, 2002).

### III. Child Populations eligible for publicly purchased vaccine.

#### A. Estimating the number of VFC eligible children.

**Uninsured.** The number of uninsured children increased or held steady each year from in 1987 through 1998, with approximately 8,193,000 uninsured children in 1987. The number of uninsured children 0-17 years of age peaked at 11,073,000 in 1997. From 1998 to 2000 the proportion uninsured decreased to 16.2% or 8,405,000. This number is approximately equal to the number of uninsured children 13 years earlier, however due to the increase in the overall size in the child population, the percent uninsured decreased from 12.9% to 11.6%. Table 1 below lists the different insurance categories by the age categories for children broken down by age groups Under 3, 3-5, 6-12 and 13-17. From these tables one can see that insurance rates vary greatly by age groupings within the child population, with younger children less likely to be insured and more likely to be covered by Medicaid.

**Table 1**  
**Proportion of US 2000 Population by Age Group**  
**And Insurance Status\***  
*In Percent*

Age Category	Private Employer Group	Private Non-Group	Medicaid	Medicare	Military Insurance (Champus)	Uninsured
<b>Under 3</b>	<b>62.0</b>	<b>2.7</b>	<b>26.4</b>	<b>0.9</b>	<b>3.1</b>	<b>11.3</b>
<b>3-5 years</b>	<b>66.9</b>	<b>2.6</b>	<b>22.0</b>	<b>0.8</b>	<b>3.3</b>	<b>10.8</b>
<b>6-11 years</b>	<b>66.9</b>	<b>3.6</b>	<b>20.6</b>	<b>0.6</b>	<b>2.8</b>	<b>11.5</b>
<b>12-17</b>	<b>67.4</b>	<b>6.6</b>	<b>16.2</b>	<b>0.7</b>	<b>2.8</b>	<b>12.2</b>
<b>Summary Under 18</b>	<b>66.3</b>	<b>4.3</b>	<b>20.3</b>	<b>0.7</b>	<b>2.9</b>	<b>11.6</b>

Younger children were less likely to be covered by private insurance with only 64.7% of children under 3 with covered by private insurance compared to 74% of children 12-17. Medicare and Champus covered

fairly comparable proportions across the child age groups. Young children are in young families who are just starting out in the world and are more likely to be unemployed or in entrance-level positions working at lower wages. Employer insurance is less commonly offered to lower-wage workers and those who were unemployed most likely had their children on Medicaid or no insurance.

**Table 2**  
**Number of Children in 2000 by Age Group**  
**And Insurance Status\***  
*In thousands*

Age Category	Private Employer Group	Private Non-Group	Medicaid	Medicare	Military Insurance (Champus)	Uninsured
<b>Under 3</b>	<b>7,363</b>	<b>321</b>	<b>3,133</b>	<b>103</b>	<b>366</b>	<b>1,340</b>
<b>3-5 years</b>	<b>7,894</b>	<b>306</b>	<b>2,600</b>	<b>91</b>	<b>387</b>	<b>1,279</b>
<b>6-11 years</b>	<b>16,603</b>	<b>887</b>	<b>5,111</b>	<b>149</b>	<b>695</b>	<b>2,843</b>
<b>12-17</b>	<b>16,222</b>	<b>1,579</b>	<b>3,895</b>	<b>174</b>	<b>685</b>	<b>2,944</b>
<b>Summary Under 18</b>	<b>48,082</b>	<b>3,111</b>	<b>14,739</b>	<b>517</b>	<b>2,133</b>	<b>8,405</b>

The insurance coverage differences across child age categories are very pertinent to task of estimating the demand for publicly financed immunizations. As a result of school entry rules, almost all children (>99%) receive all of their infant immunizations by age 5. Before entering school most children also require booster immunizations of DaTP, IPV, and MMR. Therefore, insurance status across the first 5 years of age is more relevant to the estimation of the demand for publicly funded infant and preschool immunizations than is child insurance status between 6 and 17 years of age. Age-specific insurance rates and not insurance status averaged across all of childhood should, therefore, be used in calculating the potential demand for public vaccine.

**Medicaid/SCHIP.** Tables 1 and 2 show the proportion and number of children on Medicaid and/or SCHIP in 2000 (as measured March 2001). The proportion on Medicaid/SCHIP across all children 0-17 years of age was 20.3% or 14,739,000 children, however, children under 3 (26%) and 3-5 (22%) were more likely to be covered by Medicaid than older children. The total number of children under age 5 on Medicaid/SCHIP in 2000 was 5,733,000 (or about 1 million children per year of age). For the purposes of calculating demand for public vaccines there is a crucial distinction between SCHIP programs that are Medicaid extensions (VFC eligible) and SCHIP programs that are separate programs (not VFC eligible). Separate SCHIP programs are treated like private insurance with respect to eligibility for VFC vaccine. That is those covered by separate SCHIP programs are not VFC eligible and those in SCHIP programs that are Medicaid extensions are eligible, just as Medicaid recipients are VFC eligible.

As of December 2000 there were 2,682,000 children enrolled in SCHIP, which is part of the 14,739,000 estimated to be on Medicaid and/or SCHIP by CPS. Therefore, SCHIP represents 2.682,000/14,739,000 or 18.2% of the total Medicaid/SCHIP population. In 2000 there were 240,800 children 0-5 covered by

Medicaid/ SCHIP expansion programs (VFC eligible) and 701,400 children covered under separate SCHIP programs (not VFC eligible).

**Table 3**  
**Number of US Children in Medicaid, SCHIP/Medicaid Expansion Programs and SCHIP programs separate from Medicaid**  
*In thousands*

Age Category	Medicaid Only	SCHIP/ Medicaid Expansion	SCHIP Separate Program
<b>Under 3</b>	2,563	156.0	413.7
<b>3-5 years</b>	2,127	84.8	357.7
<b>6-11 years</b>	4,181.3	254.7	675.0
<b>12-17</b>	3,186.5	194.1	514.4
<b>Summary Under 18</b>	12,058	734.6	1,946.4

**Native American Children.** All Native American/American Indian persons qualify for VFC vaccine. According to the 2000 Census there were 930,000 American Indian/Native American children 0-17 and approximately 261,000 0-5 years of age.

**Private Insurance/Underinsurance.** In Tables 1 and 2 above shows the proportion and number of children covered by private insurance, which includes employee group coverage, private non-group coverage and Champus coverage. As documented above in Table 2, there are 16,637,000 0-5 years of age covered by private insurance (employer group, private non-group and Champus). To estimate the number of children that are “underinsured” for immunizations I utilize data from two surveys of employers on the type of insurance offered to their employees and of those types of insurance what proportion cover childhood immunizations. Table 4 below summarizes the data from the ‘old’ KPMG surveys

**Table 4**  
**Percentage of Covered Workers that had “Childhood Immunizations” as a Benefit by Year\***

Type of Health Plan	1996 KPMG Survey	1998 KPMG Survey	2000** PFP Survey
Overall Average			79%
Conventional Plan	68%	79%	
HMO Plans	97%	99%	80%
PPO Plan	82%	86%	79%

POS Plan		98%	78%

\*The KFF Survey asked about coverage of Childhood immunizations only in years 1996 and 1998

\*\* . Insurance Coverage of Clinical Preventive Services in Employer-sponsored Health Plans, Preliminary Results of a Partnership for Prevention/William M. Mercer National Survey, 2001. Partnership for Prevention. Washington, DC. To be released 2003.

For a number of years, Jon Gabel from Health Research Education Trust has surveyed a sample of employers representative of different industrial sectors and different firm size. Up through the survey was under the auspices of KPMG. Kaiser Family Foundation ([www.kff.org](http://www.kff.org)) now sponsors the annual survey. Each year the survey assessed the benefits covered by each type of plan (HMO, PPO, POS and indemnity plans) offered by a representative sample of employers. However the survey content varies in the types of benefits they inquire about year-to-year. In 1996 and 1998 the KPMG/HRET survey inquired about coverage for childhood immunizations. However since 1998 the survey has not included questions about childhood immunizations. Fortunately, the group Partnership for Prevention commissioned with William M Mercer, which conducts a very similar survey of benefits of a nationally representative sample of employers. PFP commissioned Mercer to add to the survey questions concerning coverage of childhood and adult immunization.

In Table 4 above are the results of the three surveys conducted over 5 years. The PFP survey did not ask about traditional indemnity plans because by 2000 these plans had shrunk to a very small portion of the market. Interestingly, childhood immunization coverage did not vary that greatly by plan type, ranging from 78-80%, with an average weighted for individuals covered of 79%. Therefore, this survey indicates that 21% of plans offered by employers do not cover childhood immunizations. Twenty-one percent of all privately insured children (including Champus) 0-5 years of age is equal to 3,493,770 children. This estimate of children lacking coverage for immunizations does not include those who face financial barriers to immunizations due to large co-pays or deductibles. Therefore, these are most likely conservative estimates of the total number of children underinsured for immunizations.

**Estimating those underinsured due to high insurance co-pays and deductibles.** Having insurance coverage for immunizations does not guarantee access at private provider offices. High co-pays or deductibles may discourage parents from going to their private providers for immunizations. These financial barriers may prompt private practice providers to refer them out to the public health department clinics. Dr. Rick Zimmerman examined this issue in a survey of a nationally representative sample of pediatricians, family physicians and general practitioners.(Zimmerman et al., 1997) He found that 8% of physicians reported that they are likely to refer out children with *private insurance that covers immunizations*. Overwhelmingly, the reason for referring children out to the health department was cost to the families. The proportion was less (5%) where free vaccine was available for this population in the Universal Purchase states. They were more likely to refer out (11%) in states with no universal purchase and therefore no free vaccines available for this population. In a survey of US pediatricians Dr. Holly Ruch-Ross had very similar results. In her survey 7% of pediatricians reported that they refer patients out that have private insurance for immunizations. Again, 90% of the providers cited financial hardship for the parents as the primary reason for referring out. Based on these findings, I estimate that due to high co-pays or deductibles approximately 8% of *children insured with private insurance that covers immunizations* are referred out for public vaccinations.

Therefore, children with private insurance need publicly purchased vaccine for two reasons. First, approximately 3.49 million children have private health insurance that does not cover immunizations. Second, despite having insurance that does cover immunizations, approximately 1.05 million children face economic barriers due to high co-pays and deductibles. However these children are NOT eligible for VFC vaccination from private physicians or health departments. Clearly these two groups of children, totaling over 4.55 million children, overlaps significantly with the group of 2.8 million children who receive immunizations purchased with state or Section 317 funds. The overlap of these populations in large part explains the XX million children difference between the total numbers of children ages 0-5 in the various immunization coverage groups estimates compared with the numbers of children ages 0-5 estimated directly by the CPS.

**Table 5**  
**VFC Eligible Child Population by Eligibility Group**

<b>VFC Population Category</b>	<b>Number of Children 0-5 year of age</b>
Uninsured	2,610,000
Medicaid or SCHIP/Medicaid	4,930,600
American Indian/Native American	260,852
Underinsured	3,493,770
<b>Total VFC Eligible Child Population</b>	<b>11,294,222</b>

Table 5 summarizes the number of children estimated to be eligible for VFC by eligibility category. When all the children in the four different eligibility categories for VFC are summed, over ten million children in the US are eligible for VFC vaccine each year.

**B. Estimating the children served by Vaccine Purchase with Section 317 and State Funds.**

In 2000 the CDC used \$153 Million of Section 317 funds for vaccine purchase, while during the same year the VFC program purchased \$574 million and states purchased \$96 million in childhood vaccines. (Unpublished CDC data) Until the advent of the Vaccines for Children Program, the Section 317 program funds were used only for vaccine to be administered by Public Health Departments. Depending upon how states implement VFC determines how states use Section 317 funds. Section 317 funds are used to purchase vaccines delivered only in PHDs. In VFC+ states some 317 dollars are used to purchase immunizations for “underinsured” children administered in private providers’ offices. Universal Purchase states add significant state dollars to the Federal Section 317 dollars to allow private providers to administer vaccine to anyone, regardless of insurance status. Therefore, the use of Federal Section 317 dollars and State dollars for vaccine purchase varies greatly by state.

However, even the above categories belie the complexity of tracking how Section 317 purchased vaccines how they are used. For example, a nationally representative sample of state and county immunization programs estimated that of the children presenting to the PHDs for immunizations, 42% (95% CI 39%-44%) were uninsured and VFC eligible, 34% (95% CI 32% to 37%) were enrolled in Medicaid and VFC eligible, but 23% (95% CI 21% to 26%) had private insurance and were not VFC eligible. (Santoli, et. Al., 2001) The PHDs reported that they rarely turned insured children away. Those not clearly qualifying for VFC purchased vaccine (and documented as such) were given Section 317 purchased vaccines or state purchased vaccine. Therefore, some of the vaccine purchased by Section 317 funds may be used for fully insured populations in non-UP states.

From 2000 I compared data on the number of DaTP vaccines (and total child vaccines) purchased by Section 317, VFC and State funds aggregated nationally. Since these are data on number of vaccines administered, they only give use an estimate of those *served* and are an underestimate of those *eligible to be served*. I calculate the number of children 0-5 served by vaccine purchased by 317 and State funds based on projected vaccine need for the 0-5 population versus actual vaccine purchased. Children need 5 DaTP over the first 5 years of life, therefore the number of vaccines needed per child equals the estimate of children in the 0-5 age group.

- Total number of 317 DTaP vaccine purchased in 2000: 1,927,120 which is equal to the estimated population 0-5 years of age covered by Section 317 vaccine
- Total number of state purchased DTaP in 2000: 1,498,130, which is equal to the estimated population 0-5 year of age eligible for state purchased vaccines

#### **IV. Estimating the number of children not eligible for Publicly Purchased Vaccine.**

From our above discussions I can separate out two groups of children that do not qualify for publicly purchased vaccines of any category (VFC, 317, state funds) as those children living in:

- Non-UP states (VFC only or VFC+ states) that are covered by separate (from Medicaid) SCHIP Programs or are privately insured with adequate immunization coverage

The total number of children in the US in 2000 was 72,293,812, and there were 12,014,816 children in states with Universal Purchase programs or 16.6% and there were 26,253,974 in VFC+ states or 36.3%, for a total of approximately 53% of children living in states where VFC purchased immunizations were available essentially to all children. Of the 13.14 million children with adequate insurance, 16.6% or 2.18 million lived in UP states and would have their vaccinations purchased publicly.

One important caveat to these calculations is that in VFCOnly states children that are underinsured are covered by VFC only if they go to Federally Qualified Health Centers. Few VFC vaccines (3%) were given in FQHCs among all VFC categories in 2000, and given the large Medicaid population served in FQHCs there were relatively few “underserved” children in this group. In effect, this provision was a significant barrier to families preventing them from accessing child vaccinations paid for by VFC funds. Therefore, to be realistic, I add another category of “Underinsured Children 0-5 living in VFCOnly states.” Forty Seven percent (47%) of US children lived in VFC only states in 2000. Therefore, of the 4.55 million “underinsured

children” covered by VFC, realistically 47% of them or 2.14million have no access to VFC vaccinations, and they are probably served by public health clinics using Section 317 funds to deliver the vaccinations.

**Table 5**  
**Summary of US Child Population 0-5 by Eligibility for Publicly Purchased Vaccine**

	<b>Children 0-5 years of age per group</b>	<b>Percent of total population</b>
<b>Vaccines For Children</b>		
Uninsured	2,610,000	10.16%
Medicaid/SCHIP	4,930,600	19.20%
Native American	260,852	1.02%
Underinsured	3,493,770	13.60%
<b>VFC Subtotal</b>	<b>11,294,222</b>	<b>43.98%</b>
Estimated population served with Section 317 funds in 2000	1,927,120	7.50%
Estimated Population Served with State Funds in 2000	1,498,130	5.83%
<b>SubTotal <i>eligible for or served by publicly funded child vaccine</i></b>	<b>14,719,472</b>	<b>57.32%</b>
Private Insured with Financial Barriers (High Co-pay or deductible--8% of privately insured)	1,051,458	4.09%
<b>Total number of children needing public purchased vaccine</b>	<b>15,770,930</b>	<b>61.41%</b>
<b>“Adequately Covered” by Private Insurance and not in UP States</b>	<b>9,910,000</b>	<b>38.59%</b>
<b>Sum of above estimates</b>	<b>25,680,930</b>	<b>100.00%</b>
CPS estimate of total 0-5 child population in US in 2000	23,667,000	
Overestimate due to overlapping groups	2,013,930	

**Child Influenza.** Currently, for the 2002-2003 flu season, influenza vaccine is indicated only for children that meet specific clinical criteria. Approximately 8 million children and adolescents between 6 months and 17 years of age have one or more medical conditions that put them at increased risk of influenza-related complications.<sup>1</sup> These children should be given the first vaccine available. (CDC, 2002a). In the 2003-2004

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<sup>1</sup> 1) Children who have chronic disorders of the pulmonary or cardiovascular systems, including asthma and cystic fibrosis; 2) Children who have required regular medical follow-up or hospitalization during the preceding year because of chronic metabolic diseases (including diabetes mellitus), renal dysfunction, hemoglobinopathies (including sickle cell anemia), or immuno-suppression (including immuno-suppression caused by medications or by human immunodeficiency virus); 3) Children and teenagers (aged 6 months to 18 years) who are

flu season and beyond the CDC has changed the policy recommendations for all children 6-23 months of age and children 2-18 years of age that are household contacts of children < 2 years of age. (CDC, 2002b) This dramatically increases the number of children that are to receive the influenza vaccination. Influenza is now approved under the Vaccine for Children's program as well. Therefore, Influenza vaccination will increase the number of vaccines due children 0-2 years of age and increase the costs to the VFC, state and 317 programs for their purchase. The addition of influenza vaccination will not, however, change the numbers of children needing VFC or other publicly funded vaccinations.

## **B. ADULTS (annual Influenza, Pneumococcal 23 valent, and dT every 10 years)**

**Insurance status.** Tables 7 and 8 show the proportion and number of adults in the United States in 2000 by age groups and by insurance status. Of the over 200 million adults in the United States 18-64 years of age 30 million were uninsured during 2000. These estimates do not reflect the fact that some workers are not covered by their own employer, but were covered by another family member's employment-based policy. (Mills RJ, 2001) Uninsurance rates are highest for young adults and decrease linearly from 27.3% in adults 18-24 to 13.5% among adults 60-64 years old. The uninsurance rate drops dramatically for adults 65 and over, as they universally qualify for Medicare. Almost two-thirds of adults 65 or over have private insurance in addition to Medicare. While the elderly do not receive influenza and pneumococcal immunizations at nearly adequate rates, they are almost uniformly insured for the price of the immunizations. Medicare's does not currently reimburse providers for the costs of administration of immunizations, which may contribute to the relatively low rates of immunizations. Several studies have associated rates of immunization receipt with vaccine administration fees. (Fairbrother, 2000; Szilagyi, 2000; Zimmerman, 2001; Wood and Halfon, 1996) CMS is reconsidering increasing their fee attached to the CPT codes for administration of vaccinations and may decide to allow providers to bill under those CPT codes. The reimbursement rate will increase to \$8 in 2003.(Federal Registry, 2002)

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receiving long-term aspirin therapy and therefore might be at risk for developing Reye syndrome after influenza infection; 4) Adolescents who will be in the second or third trimester of pregnancy during the influenza season; 5) Children who are residents of facilities that care for people with chronic medical conditions

**Table 7**  
**Proportion of US 2000 Population by Age Group**  
**And Insurance Status\***  
*In Percent*

<b>Age Category</b>	<b>Private Employer Group/ Non-group</b>	<b>Medicaid</b>	<b>Medicare</b>	<b>Military Insurance</b>	<b>Uninsured</b>
<b>18-24</b>	<b>64.8</b>	<b>8.7</b>	<b>0.6</b>	<b>2.9</b>	<b>27.3</b>
<b>25-34</b>	<b>72.1</b>	<b>6.3</b>	<b>1.1</b>	<b>2.2</b>	<b>21.2</b>
<b>35-44</b>	<b>78.6</b>	<b>5.4</b>	<b>1.8</b>	<b>2.6</b>	<b>15.5</b>
<b>45-54</b>	<b>81.6</b>	<b>4.9</b>	<b>3.5</b>	<b>3.0</b>	<b>12.0</b>
<b>55-59</b>	<b>77.3</b>	<b>6.3</b>	<b>6.0</b>	<b>3.2</b>	<b>13.8</b>
<b>60-64</b>	<b>73.9</b>	<b>7.4</b>	<b>12.1</b>	<b>4.5</b>	<b>13.5</b>
<b>&gt;=65</b>	<b>61.5</b>	<b>8.1</b>	<b>95.4</b>	<b>4.2</b>	<b>0.7</b>

**Table 8**  
**Number of Persons in US in 2000 by Age Group and Insurance Status**  
*In thousands*

<b>Age Category</b>	<b>Private</b>	<b>Medicaid</b>	<b>Medicare</b>	<b>Military Insurance</b>	<b>Uninsured</b>
<b>18-24</b>	<b>17,472</b>	<b>2,344</b>	<b>161</b>	<b>777</b>	<b>7,350</b>
<b>25-34</b>	<b>27,009</b>	<b>2,355</b>	<b>424</b>	<b>822</b>	<b>7,926</b>
<b>35-44</b>	<b>35,212</b>	<b>2,399</b>	<b>815</b>	<b>1,167</b>	<b>6,938</b>
<b>45-54</b>	<b>31,050</b>	<b>1,869</b>	<b>1,319</b>	<b>1,142</b>	<b>4,571</b>
<b>55-59</b>	<b>10,306</b>	<b>840</b>	<b>798</b>	<b>429</b>	<b>1,836</b>
<b>60-64</b>	<b>7,716</b>	<b>774</b>	<b>1,260</b>	<b>469</b>	<b>1,412</b>
<b>&gt;=65</b>	<b>20,292</b>	<b>3,293</b>	<b>31,733</b>	<b>1,395</b>	<b>245</b>

In 2000, according to the Kaiser annual survey of insurance the distribution of types of insurance products was as follows; Preferred Provider Organizations had 41% of the market, and HMOs had 29% of the market, Point-of-Service and Indemnity plans had 22% and 8% of the market respectively. The different insurance products vary in their likelihood of offering coverage for adult immunizations. In Table 8A (below) the results of a 2001 survey conducted by Mercer, Inc., in which the non-profit group Partnership for Prevention commissioned additional questions on coverage of adult immunizations. (Communication, Partnership for Prevention, August 2002) In 2000 57% of PPO insurance products, 58% of Point-of-service insurance products and 66% of HMO insurance products offered adult insurance coverage. In 2000, 8% of adults were covered by indemnity insurance products, which typically do not cover adult immunizations. Across all insurance products, weighted by market share, 55% of employers offered insurance that covered adult immunizations, leaving 45% not covered or UNDERinsured for immunizations.

In 1995 the ACIP/CDC issued new recommendations that healthy adults 50 years and over should receive get annual Influenza vaccinations and the pneumococcal 23 valent vaccination at least once. As can be noted from Tables 7 and 8 above, among adults fifty to sixty-four, 5,553,000 are uninsured and would require publicly purchased vaccination. Moreover, among the 35,448,000 insured adults in this age group 45%, or 15,951,600 is UNDERinsured for influenza and pneumococcal vaccinations.

**Table 8A**

**Weighted Average of Adult Immunization Coverage**

	<b>Immunization Coverage</b>	<b>Market Share</b>	<b>Weighted Average</b>
<b>PPO</b>	<b>57%</b>	<b>41%</b>	
<b>PPS</b>	<b>58%</b>	<b>22%</b>	
<b>HMO</b>	<b>66%</b>	<b>29%</b>	
<b>Indemnity</b>	<b>0%</b>	<b>8%</b>	
			<b>55%</b>

**Adults with high risk conditions.** Annual influenza vaccination and one-time pneumococcal vaccination is recommended for adults 18-49 with chronic diseases affecting the lungs, heart, immune system and selected other organ systems. (MMWR, 2000). Utilizing responses to questions regarding their health, specific medical conditions, etc. from a nationally representative sample of adults to the National Health Interview Survey the CDC used the following specific criteria to identify persons at higher risk for either suffering increased morbidity and mortality from influenza or transmitting it to those at increased risk. These conditions included:

- a) Cardiopulmonary condition (asthma, emphysema, chronic bronchitis, TB, heart attack, heart failure, chronic heart condition, rheumatic heart disease)
- b) Immune compromised through ERSD, SC disease, diabetes
- c) Being in the trimester of pregnancy during flu season
- d) Those that can transmit to high risk individuals include those in the medical profession, those that work in nursing homes, chronic care facilities or are household members of persons who are high risk.

In addition pneumococcal immunization is recommended for persons with chronic liver disease, cirrhosis. (MMWR, 2000?) Table 9 below shows the estimates of the numbers of individuals in the different age groupings of adults for whom annual influenza and one-time pneumococcal vaccine are indicated.

**Table 9**  
**Number of Adults Indicated to Receive Influenza, Number UNDER Insured**  
**Number Uninsured and Total In Need of Public Vaccine Annually**

<b>Population Age group</b>	<b>Total Pop. Size</b>	<b>% 'High Risk' or for whom Influenza and Pneumococcal vaccine is recommended</b>	<b>Total High Risk pop.</b>	<b>Within High Risk Population Number Uninsured**</b>	<b>Within High Risk Population the Number UNDER Insured#</b>	<b>Total Number in Need of Publicly Purchased Vaccine Annually</b>
<b>50-64</b>	<b>43 million</b>	<b>100%</b>	<b>43 million</b>	<b>5.5 Mi million</b>	<b>15.95 million</b>	<b>21.45 Million</b>
<b>18-49</b>	<b>136 million</b>	<b>11%</b>	<b>15 million</b>	<b>2.71 Million</b>	<b>5.0 Million</b>	<b>7.71 Million</b>
<b>Total adults 18-64</b>	<b>180 million</b>		<b>58 million</b>	<b>8.21 Million</b>	<b>20.95 Million</b>	<b>29.16 Million</b>

\*1995 recommendation is for 100% of this group to receive influenza annually and pneumococcal vaccine one time

\*\*assumed to be 18.6% of total high risk population

# Insured represent 74.25% of the total population, and 45% of insured lack coverage for immunizations.

The number in need of publicly purchased vaccine is the sum

- The number of uninsured in the age/high risk groups. In 2000, approximately 18.6% persons in the 18-49 year old age group lacked insurance for the entire year. (Table 24 CPS 2000)
- The number of insured that lacked coverage for immunizations, which as we noted above was approximately 45% of those with private insurance. Since those with private insurance are 74% of the total population, approximately 33% of the total population, and presumably a similar proportion of the high risk population, is underinsured with respect to adult immunizations.

Applying these numbers to the total numbers in the respective groups we s

**Tetanus.** Tetanus booster is indicated for all adults, but only those on Medicaid and 55% of those on private insurance have coverage for Td. Medicare part B pays does not pay for the Td booster vaccination, and therefore, even elderly adults are indigent for this vaccination. In 2000, of the 204 million adults approximately 133 million had private insurance, with 45% or 59.8 million underinsured for Td. Approximately 30.3 million adults lacked insurance the entire year. Therefore, 90.1 million adults lacked insurance coverage for Td. Approximately, 13.9 million have Medicaid coverage which uses public funds to cover Td vaccination. Each year 10% of all adults, or 20.4 million, needs a Tetanus booster, and of those 10.4 million need publicly purchased vaccine.

## **SECTION II. Number and Cost of Publicly Purchased Vaccine**

Table 10 below summarizes the estimated number and cost of vaccines that would need to be purchased under the Federal VFC program, the federal Section 317 program and the State purchase programs in order to meet the need of all vaccine indigent children in the US. This estimate does not include the children with insurance coverage for vaccination but who face financial barriers. This is because they currently do not qualify for publicly purchased vaccine and because our estimates, as described above, over-estimate the size of vaccine indigent child population due to overlap of groups. The total cost to the VFC program for the purchase of the core set of vaccine (DaTP, IPV, Hepatitis B, HIB, Prevnar, MMR and Varicella) is estimated to be \$852,713,761.00. The total projected annual Section 317 Costs were estimated to be \$113,108,815.00 and the projected annual State purchase program costs was \$145,497,560.00. Summing the different purchase program costs, the total projected annual costs for publicly purchased vaccine for children 0-5 is \$1,111,320,100.

**Table 10**  
 Number and Cost of Child Vaccine Purchased Publicly

<b>VFC</b>	<b>Estimated Number of VFC Eligible Children 0-5</b>	<b>Estimated Number of VFC Vaccines To Be Administered</b>	<b>Average CDC Contract Price per Dose in 2000</b>	<b>Projected Annual VFC Expenditures</b>
DTaP	11,294,222	11,294,222	\$12.86	\$145,243,694.92
MMR	11,294,222	4,517,689	\$15.64	\$70,656,652.83
IPV	11,294,222	6,776,533	\$8.80	\$59,633,492.16
Hepatitis B	11,294,222	6,776,533	\$10.04	\$68,036,393.33
Prevnar (7)	11,294,222	9,035,378	\$45.99	\$415,537,015.82
Varicella	11,294,222	2,258,844	\$41.44	\$93,606,511.94
<b>Total</b>				<b>852,713,761.00</b>

**Table 10 cont'd**  
 Number and Cost of Child Vaccine Purchased Publicly

<b>Section 317</b>	<b>Estimated number of children 0-5 served under Section 317</b>	<b>Estimated Number of Vaccines to Be Administered under Section 317</b>	<b>Projected Annual Section 317 Expenditures</b>
DTaP	1,927,120	1,927,120	\$24,782,763
MMR	1,927,120	770,848	\$12,056,063
IPV	1,927,120	1,156,272	\$10,175,194
Hepatitis B	1,927,120	1,156,272	\$11,608,971
Prevnar (7)	1,927,120	1,541,696	\$70,902,599
Varicella	1,927,120	385,424	\$15,971,971
<b>Total</b>			<b>145,497,560.00</b>

<b>State Programs</b>	<b>Estimated number of children 0-5 served with State purchased Vaccine</b>	<b>Estimated Number of Vaccines to Be Administered under State programs</b>	<b>Projected Annual State Vaccine Expenditures</b>
DTaP	1,498,130	1,498,130	\$19,265,952
MMR	1,498,130	599,252	\$9,372,301
IPV	1,498,130	898,878	\$7,910,126
Hepatitis B	1,498,130	898,878	\$9,024,735
Prevnar (7)	1,498,130	299,626	\$13,779,800
Varicella	1,498,130	299,626	\$49,666,006
<b>Total</b>			<b>\$113,108,815.00</b>

**Projected Costs of publicly purchased adult vaccines.** Table 11 shows the cost of purchasing all indicated adult vaccinations assuming 100% uptake of all eligible adults.

**Table 11**  
**Cost of Adult Vaccinations Per Year (assuming 100% uptake)**

Adult Vaccine	Number of persons eligible each year*	Vaccine Cost	Total Vaccine Purchase Cost
Influenza	29,160,000	\$ 5.53	\$ 161,254,800.00
Pneumococcal	13,122,000	\$ 12.54	\$ 164,549,880.00
Tetanus	10,400,000	\$ 2.00	\$ 20,800,000.00
<b>Total Adult Vaccine Purchase Costs</b>			<b>\$ 346,604,680.00</b>

\*assumes that 55% of adults have already received pneumococcal vaccine and therefore 45% need pneumococcal vaccine in the current year (Nelson D, et. al., 2002)

## DISCUSSION

There are a number of trends in both private and public insurance that may further erode insurance coverage for immunizations and/or increase financial barriers for those with insurance coverage for adult and child immunizations. Barring any major legislative intervention, this would result in an increase in the number of adults and children who will need publicly purchased vaccinations.

**Private Insurance Market.** In the future, financial barriers to immunizations for the insured population are very likely to increase. There is a shift in the costs of health insurance from employers to employees. “Employees are paying more in health insurance premiums, and because of changes in deductibles and co-insurance requirements they also are paying more for their health care.” (Short; 2002) Insurance premiums increased 11% per year between 1999 and 2001 and by 12.7% in 2001-2002, the highest rates of increase since the early 1990’s. A KFF survey of employers found that almost half planned to pass some or all of these premium increases to their employees. The employers predicted that they would offer insurance plans with larger co-pays, deductibles and other cost-sharing approaches. (Kaiser Foundation, 2002)

Furthermore, due to these same rapidly increasing premium costs employers are moving toward offering employees less expensive plans that have more restricted benefit packages. These more restricted benefit packages are less likely to cover child and adult immunizations. The HRET/KFF annual survey of provider insurance benefits found there has been a movement away from HMO plans to less structured insurance vehicles such as PPS and POS type plans. From 1988 to 2001 the percentage of covered workers offered an HMO declined from 68% to 46% and at the same time the percentage offered a PPO or POS increased from 49% to 71% and from 30% to 37% respectively. In 2001 48% of privately insured individuals were enrolled in PPO plans and 22% in POS type plans, dramatically increased from 1996 when 28% were in PPOs and 14% were in POS

plans. As documented in Table 4, all HMO plans, by regulation, cover child immunizations, while only a portion of PPO and POS plans cover immunizations for children. As the insurance market moves toward these types of plans, insurance coverage for childhood immunizations will decrease.

Furthermore, fewer employers are offering health insurance; from 1987 to 1999, employer-based health insurance decreased from 69.2% to 65.8%. Employers are increasing the cost-sharing required of employees resulting in more employees declining coverage (15% in 2000). These trends occurred despite the vibrant, growing economy the US experienced in the 1990s. It is predicted that these trends will continue fewer and fewer individuals covered by employer-based group health insurance. (Gabel J et. al, 2002) Lastly, an increasing number of people are purchasing individual health insurance, 7% in 2000 (Gabe, 2002). Individual health insurance plans are more likely to have larger consumer cost-sharing and have less generous benefits, both of which reduce the likelihood of private insurance covering immunizations.

Thus, the trends indicate a decrease in the coverage of children's vaccinations by private insurance plans. This will result in a much larger proportion of US children dependent on publicly purchased vaccines. However, there is pending legislation that will make it mandatory for all private insurance plans (much like HMOs must now) to cover children's vaccines. Senate bill 1297, introduced by Senator Durbin, entitled the Comprehensive Insurance Coverage of Childhood Immunization Act of 2001, will require all insurance plans to cover childhood immunizations, even those protected under ERISA. This would greatly reduce the number of underinsured children.

### **Trends in Public Health Insurance Coverage in the Future.**

Public insurance coverage for immunizations for low-income children is also predicted to decline. Uninsured children qualify for publicly purchased vaccine under the VFC program. However, lack of insurance is a substantial barrier to accessing physician visits where VFC vaccines may be available. Approximately 80% of uninsured children are eligible for either Medicaid and/or SCHIP. (Dubay et al., 2002) Therefore, a viable strategy to improve insurance coverage for children is to increase outreach and enrollment in Medicaid/SCHIP for the currently eligible. This has been occurring in states during the past 3 years. However, given that most states faced deficits last year and almost all face even larger deficits in 2003, it is likely that Medicaid and/or SCHIP outreach and enrollment efforts will decrease rather than increase. A recent survey of state Medicaid programs by the Kaiser Commission on Medicaid and the Uninsured found that 49 states are instituting cost containment strategies. Some of the states have increased patient cost sharing for physician visits. North Carolina froze SCHIP enrollment in 2001 and 34,000 children, primarily children who lost Medicaid, were placed on a waiting list. Other states are considering similar measures. (Kaiser Commission, 2003)

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