Appendix 4.1
FACTORS THAT CAN AFFECT CONSUMERS' AND PHYSICIANS' USE OF VACCINES

Factors That Can Affect Consumers' Vaccine-Seeking Behavior

> ***The demands of this poor public are not reasonable, but they are quite simple. It dreads disease and desires to be protected against it. But it is poor and wants to be protected cheaply . . . What the public wants, therefore,*** *is* ***a cheap*** *magic charm to prevent, and a cheap* ***pill or potion to cure, all*** *disease . . .*
>
> *Thus it was really the public and not the medical profession that took up uaccination with irresistible faith . . .*
>
> George Bernard Shaw
> ***The Doctors Dilemma***
> **1911**

The American public's enthusiasm for vaccines may have declined since Shaw's time. Research has demonstrated that public demand for vaccines now depends on such factors as the public's general attitudes concerning the dangers of specific diseases and benefits of vaccination, beliefs regarding the safety and efficacy of a particular vaccine, and the convenience of being vaccinated (Glasser, 1958; Clausen, 1954; Rosenstock, 1959; Deasey, 1956). (See figure 4.1 A.) Researchers also have identified demographic variables that can be correlated with vaccine-seeking behavior (ORC, 1978; Rosenstock, 1959, Pearman, 1978). As discussed below, the cost of vaccination may also influence public demand for vaccines (Luft, 1978).

Investigations to identify factors that affect the public's demand for vaccines began in the 1950's, when researchers attempted to identify the factors that were influencing the demand for polio vaccine. In 1959, Rosenstock and associates used the findings of six studies to help explain why people were not seeking vaccination against poliomyelitis (Rosenstock, 1959). Rosenstock divided behavioral factors into two major categories: 1) personal readiness factors, and 2) social and situational factors. The first category includes personal attitudes that may affect an individual's willingness to seek vaccination: a) perceived personal susceptibility to a particular disease (includes perceived likelihood of local occurrence of the disease), b) perceived seriousness of the disease, and c) perceived safety and efficacy of the vaccine. The second category, social and situational factors, includes: a) social pressure and b) convenience of vaccination. In one of his studies, Rosenstock concluded (Rosenstock, 1959):

> Readiness and social factors may operate with a degree of independence of each other or they may interact . . . The evidence to date suggests, that among the currently unvaccinated, personal readiness to obtain poliomyelitis vaccination is so weak that rather strong social supports may be needed to modify their behavior in the short run. Education for increased personal readiness can probably be effective.

A more recent study, entitled *Public Attitudes Toward Immunization: August 1977 through February 1978*, was conducted for the Center for Disease Control (CDC) by Opinion Research corporation (ORC). [1] The purposes of **ORC's Public survey were (ORC) 1978):**

1. To determine the relationships between individuals' past experiences with immunizations and their desire to receive, or have their children receive, other immunizations.
2. To establish baseline data regarding:
   - Consumers' desire to receive specific immunizations;
   - Consumers' belief in likelihood of a disease occurring in their local area;
   - Consumers' belief in the seriousness of a disease;
   - Consumers' belief in their vulnerability to a disease;

Figure 4.1A.— Factors That Can Affect Consumers' Vaccine-Seeking Behavior

Personal readiness factors
- Perceived susceptibility to a disease
- Perceived likelihood of local occurrence of a disease
- Perceived seriousness of a disease
- Perceived safety and effectiveness of the vaccine

Social and situational factors
- Social pressure
- Convenience
- Demographic characteristics

Vaccine costs and health insurance

SOURCE: OTA's interpretation of data from Rosenstock, 1959; ORC, 1978; Luft, 1978.

[1] ORC's study was developed and funded by CDC's Bureau of Health Education (BHE) under HEW contract No. 200-77-0723. Reprint requests for that report should be addressed to BHE, CDC, in Atlanta, Ga., not to ORC.

- Consumers' belief in the safety and efficacy of various vaccines; and
- The effect of local laws and regulations on consumers' acceptance of vaccines.

Data from ORC's study appear to verify, at least in part, Rosenstock's findings in the late 1950's regarding the importance of selected factors that influence consumers' vaccine-seeking behavior. First, people must be convinced of a reasonable likelihood that a disease is going to occur in their local area and that they are susceptible to the disease. (Sometimes, individuals perceive themselves, at times falsely, to be protected from a given disease.) Second, people must be convinced that a disease is serious, Third, people must be convinced of at least the safety, if not the efficacy, of a vaccine before they will tend to accept it.

Using a multivariate statistical analysis, ORC attempted to predict the intent of respondents to seek vaccination for themselves and their children. Intent is difficult to predict and has not yet been statistically correlated with actual future behavior, but in its analysis, ORC did identify at least a few important discriminating variables. (See table 4.1 A.) These variables are beliefs or events that may influence a person's decision to seek or avoid vaccination. By themselves, these variables cannot be used to predict a person's behavior; however, they do indicate the basis on which consumers' decisions will likely be made. (ORC researchers did not attempt to study interactions among these discriminating variables or the potential influences of such interactions on people's behavior. They did recommend, however, that an analysis of interacting variables be included in future research.)

Those attempting to mount a successful vaccination program probably should consider all factors identified in Rosenstock's and ORC's investigations. Launching a television campaign to educate people about the evils of disease and virtues of vaccines, for example, probably would show little return on investment, if a community's biggest obstacle to an im-

Table 4.1A.—Factors (Discriminating Variables) That Influence ORC-Surveyed Consumers' Vaccine-Seeking Behavior

Factor (discriminating variable)[a]	P value	Type of vaccine: Diphtheria	Tetanus	Polio	Smallpox	Asian flu	Influenza B	Swine flu	Total number of vaccines
1. Race	< .05	X	—	X	X	X	X	X	6
	< .10	—	—	—	—	—	—	—	0
2. Perceived *likelihood* of local occurrence of disease	< .05	X	X	X	X		—	X	5
	< .10	—	—	—	—	—	—	—	0
3. Perceived personal *susceptibility* to the disease (includes prior case of, or immunization for, the disease)	< .05	—	—	X	X	X	X	X	5
	< .10	X	X	—	—	—	—	—	2
4. Perceived *safety* of the vaccine (includes prior adverse reaction experience)	< .05	—	—	X	X	X	—	X	4
	< .10	—	—	—	—	—	—	—	0
5. Perceived *seriousness* of the disease	< .05	X	—	—	X	—	—	X	3
	< .10	—	—	—	—	—	—	—	0
6. Household income	< .05	X	—	X	X	—	—	—	3
	< .10	—	—	—	—	—	—	—	0
7. Sex	< .05	—	X	—	—	—	—	X	2
	< .10	X	—	—	—	—	—	—	2
8. Age	< .05	X	—	—	—	—	—	—	1
	< .10	—	—	—	—	—	—	—	0
9. Education	< .05	—	—	—	—	—	—	—	0
	< .10	—	X	—	—	—	—	—	1
10. Belief in mass immunization programs	< .05	—	—	—	—	—	—	—	0
	< .10	—	—	—	—	—	X	—	1
Total number of factors	< .05	5	2	5	6	3	2	6	—
	< .10	2	2	0	0	1	1	0	—

[a]Factors (discriminating variables) found in ORC's survey are listed in descending order according to the number of vaccines per factor.

SOURCE: OTA's interpretation of data from *Public Attitudes Toward Immunization: August 1977 Through February 1978.* Opinion Research Corporation, 1978 (See ORC, 1978.)

munization program is a lack of public transportation. Likewise, funding a worksite immunization program might be futile, if the intended vaccine recipients do not perceive the vaccine as beneficial. Another factor that might be considered in mounting a vaccination program is the cost of vaccination to vaccine recipients.

Personal Readiness Factors

As noted above, personal readiness factors were divided in the system of classification of factors developed by Rosenstock into the following major categories: a) perceived susceptibility to a disease (which includes perceived likelihood of local occurrence of the disease), b) perceived seriousness of a disease, and c) perceived safety and efficacy of the vaccine (Rosenstock, 1959). Rosenstock's categories are used to classify various researchers' findings in the discussion below.

PERCEIVED SUSCEPTIBILITY TO A DISEASE AND PERCEIVED LIKELIHOOD OF LOCAL OCCURRENCE OF A DISEASE

Many people who did not seek polio vaccination during the 1950's believed they were at low risk of contracting poliomyelitis (Glasser, 1958). Many adults, for example, apparently perceived themselves to be at low risk for contracting polio, because most polio vaccine campaigns were targeted at children.In general, the advertising of high risk target populations tended to reinforce perceptions of safety from polio among individuals not identified as being at high risk. As Rosenstock stated, "It is known that behavior is determined more by one's beliefs about reality than by reality itself, and that people vary markedly in their interpretation of reality" (Rosenstock, 1959).

Results reported by ORC regarding the importance of interviewees' "perceived susceptibility to disease" and "perceived likelihood of local occurrence of disease" are shown in tables 4.1B and 4.lC. As shown in table 4.1A, at the 95 percent level of confidence, perceived personal susceptibility to a disease and perceived likelihood of local occurrence of a disease share equally the second most significant degree of discriminating power. At the 90 percent level of confidence, perceived susceptibility appears to be the most important variable.

PERCEIVED SERIOUSNESS OF A DISEASE

One important influence on an individual's willingness to seek protection from a disease is that person's belief about the seriousness of the disease. In 1959, a study commissioned by the National Foundation for Infantile Paralysis showed that those adults (mostly men) who believed that polio was milder in adults than in children tended not to be vaccinated (Rosenstock, 1959).

As shown in table 4.1A, in ORC's survey, perceived seriousness of disease ranks as the fifth most discriminating variable. Data from ORC's survey regarding the perceived seriousness of diseases for

Table 4.1 B.—ORC Interviewees' Perceptions of Their Personal Susceptibility to Particular Diseases

"For the following disease, please tell *me ho w likely you think it would be that you might* **catch** *it if it occurred extensively in your local area. "*

	Percent of ORC interviewees responding			
	"Very likely"	"Some chance"	"Very likely"	"Some chance"
Disease	February 1978 N = 2,080		August 1977 N = 2,006	
Asian flu	10%	51%	10%	44%
Influenza B	10%	47%	9%	44%
Swine flu	10%	43%	8%	37%
Diphtheria	7%	19%	5%	21%
Mumps	5%	23%	5%	19%
Pertussis	5%	20%	4%	18%
Measles	5%	21%	5%	17%
Tetanus	4%	23%	4%	24%
Rubella	4%	20%	5%	18%
Typhoid	4%	18%	6%	19%
Smallpox	4%	17%	4%	15%
Rabies	3%	24%	5%	23%
Polio	2%	15%	4%	16%

SOURCE: *Public Attitudes Toward Immunization: ...ust 1977 Through Febru·ary 1978,* Opinion Research Corporation, ...'8. (See ORC, 1978.)

Table 4.1 C.—ORC Interviewees' Perceptions of the Likelihood of Particular Diseases' Occurring in Their Local Area

"For each disease, please tell *me how likely it will be that each will occur in your local area during the next 12 months. "*

	Percent of ORC interviewees responding			
	"Very likely"	"Some chance"	"Very likely"	"Some chance"
Disease	February 1978 N = 2,080		August 1977 N = 2,006	
Measles	26%	49%	29%	47%
Mumps	20%	50%	20%	50%
Influenza B	19%	46%	16%	42%
Rubella	19%	45%	21%	40%
Asian flu	15%	52%	14%	43%
Swine flu	14%	40%	10%	33%
Pertussis	8%	28%	8%	31%
Tetanus	7%	31%	11%	32%
Rabies	7%	31%	6%	34%
Smallpox	5%	16%	5%	18%
Diphtheria	5%	12%	3%	14%
Polio	4%	19%	5%	21%
Typhoid	4%	14%	3%	13%

SOURCE: *Public Attitudes Toward Immunization: August 1977 Through Febru·ary 1978,* Opinion Research Corporation, 1978. (See ORC, 1978.)

adults are displayed in table 4.lD. Five diseases, polio, rabies, typhoid, smallpox, and tetanus, were perceived as very serious for adults by 50 percent or more of the respondents in at least one of the two surveys. No type of flu was perceived as very serious by a majority of the respondents in either survey: Swine flu was perceived as very serious by an average of 32.4 percent, Asian flu by an average of 21.5 percent, and influenza B by 15 percent.

With few exceptions, ORC survey respondents generally perceived the diseases that they believed to be the most serious as the diseases least likely to occur in their local area and as the diseases they would be least likely to contract. Polio, rabies, typhoid, and smallpox, for example, were perceived as the four most serious diseases, but also as the four diseases respondents believed they were least likely to contract. Contrastingly, most respondents perceived "flu" to be among the least serious diseases, but also the disease most likely to occur in respondents' local area and most likely to be contracted by respondents.

PERCEIVED SAFETY AND EFFECTIVENESS OF THE VACCINE

An individual's belief about the safety and effectiveness of a vaccine may influence that person's decision to seek vaccination as much as does the individual's perception regarding either personal susceptibility to, or seriousness of, a disease. Three studies have documented the significance of an individual's doubt about the safety and effectiveness of polio vaccine as a major reason for the individual's unwillingness to receive this vaccine (Clausen, 1954; Deasy, 1956; Glasser, 1958).

In 1978, Pearman reported the results of a household survey (N = 342) designed to assess the willingness of the public to participate in future influenza immunization projects, especially in light of the negative image of the swine flu program (Pearman, 1978). In the aggregate, 52 percent of respondents in this survey had participated in the swine flu program; 59 percent anticipated participating in a future immunization program if convinced that a flu outbreak was pending; and 53 percent thought people should take flu shots. Although approximately half of the respondents generally favored flu shots; 24 percent thought people should not take flu shots; and 25 percent said they would not participate in future programs.

As shown in table 4.1A, in the ORC study, perceived vaccine safety ranks as the fourth most discriminating variable. ORC researchers reported the data displayed in tables 4.lE and 4.lF regarding the perceived safety of vaccines. Overall, respondents in ORC's study perceived vaccines as relatively safe: About 90 percent perceived vaccines as either very or moderately safe. (See table 4. IE.) ORC survey respondents with lower incomes (less than $5, 000 per year), respondents with less than a high school education, and nonwhite respondents tended to doubt the safety of vaccines more than their richer, better educated, and white counterparts did. Nearly 32 percent of the respondents felt that some specific vaccines were unsafe or a threat to one's health; about 57 percent said that there were not specific vaccinations which they felt were unsafe. (See table 4.1F.)

Long-term effects of the highly publicized adverse reactions to swine flu vaccine on the public's use of

Table 4.1D.—ORC Interviewees' Perceptions of the Seriousness of Particular Diseases

"For each of the following diseases, please tell me how serious you think it would be if an adult caught it."

Disease	Percent of ORC interviewees responding "Very serious" February 1978 N = 2,080	August 1977 N = 2,006
Polio	68%	64%
Rabies	63%	61%
Typhoid	51%	49%
Smallpox	51%	47%
Tetanus	47%	49%
Diphtheria	41%	38%
Rubella	36%	36%
Mumps	31%	32%
Swine flu	29%	36%
Measles	26%	28%
Pertussis	23%	21%
Asian flu	20%	23%
Influenza B	15%	15%

SOURCE: *Public Attitudes Toward Immunization: August 1977 Through February 1978*, Opinion Research Corporation, 1978. (See ORC, 1978.)

Table 4.1E.—ORC Interviewees' Perceptions of the General Safety of Immunizations

"In general, how safe do you think vaccinations and immunizations are?"

Degree of safety of immunizations	Percent of ORC interviewees responding February 1978 N = 2,080	August 1977 N = 2,006
Very safe	54%	51%
Moderately safe	36%	37%
Somewhat safe	5%	6%
Not safe at all	1%	1%
Don't know	4%	4%
No response	—[a]	1%

[a]Less than .5%.

SOURCE: *Public Attitudes Toward Immunization: August 1977 Through February 1978*, Opinion Research Corporation, 1978. (See ORC, 1978.)

Table 4.1 F.—ORC Interviewees' Perceptions of the Safety of Specific Immunizations

"Are *there any specific vaccinations or immunizations which you fee/ are unsafe or a threat to one health? Which ones?"*

Response	Percent of ORC interviewees responding February 1978 N = 2,080	August '1977 N = 2,006
Yes (major mentions)	320/~ (N = 733)	36% (N=722)
Swine flu	59°4	78%
Flu (nonspecific)	300/o	110/0
Asian flu	30/0	3%
Smallpox	30/0	—a
No	570/0	54%
Don't know	**10°/0**	90/0
No response	1%	**10/0**

[a]Less than 5%

SOURCE *Public Attitudes Toward Immunization August 1977 Through February 1978*, Opinion Research Corporation 1978 (See ORC 1978)

future vaccines are not known. A major influence on public behavior may be the amount and types of information about the safety and efficacy of a vaccine that is presented to a person before vaccination. The Department of Health, Education, and Welfare (HEW) may require that vaccine recipients be informed of vaccine safety and efficacy through patient information sheets (and possibly, patient informed consent forms) before they are vaccinated in any publicly financed immunization program. The impact of the provision of vaccine safety and efficacy information on individuals' vaccine-seeking behavior is unknown. The Food and Drug Administration (FDA) plans to expand the use of PPIs and to study the effects of their use on several factors, including patients' drug-consuming behavior and physicians' drug-prescribing behavior. Vaccines could be included in FDA's studies.

Social and Situational Factors

As noted above, Rosenstock **divided social and situational factors that can affect consumers'** vaccine-**seeking behavior into two categories: a) social pressure, and** b) convenience (Rosenstock, 1959). Rosenstock and others (e. g., Pearman, 1979; ORC, 1978) also have attempted to measure the influence of demographic characteristics on public demand for vaccines.

SOCIAL PRESSURE

Analyses of some data indicate that an individual's decision to seek vaccination maybe influenced by the social pressures applied by other persons who are important to that individual. Belcher showed in one community that people who held presumably respectable positions (e. g., school teachers, ministers, and physicians) effectively encouraged individuals to seek vaccination against polio (Belcher, 1958). Glasser verified the potential influence of physicians on people's vaccine-seeking behavior (Glasser, 1958).

CONVENIENCE

As stated by Rosenstock, "For any individual with a degree of readiness to be vaccinated, the ultimate decision will be facilitated the more convenient, simple, and inexpensive the action is" (Rosenstock, 1959). In this context, convenience includes such factors as travel time and distance, hours of operation, and acceptability of the facilities in which vaccination is performed.

Validating Rosenstock's findings that both social pressure and convenience are important influences on people's vaccine-seeking behavior, Pearman's study showed that employed men, more often than women, stated that they received swine flu shots because: (Pearman, 1978)

1. Shots were available at their work place (convenience factor).
2. Coworkers pressured them to take shots (social pressure).
3. They perceived participation in immunization to be company policy (social pressure).

DEMOGRAPHIC CHARACTERISTICS

Both Pearman and Rosenstock found a positive relationship between an individual's amount of formal education and his or her participation in vaccination programs (Pearman, 1978; Rosenstock, 1959). In general, both of these investigators found that the more formal education a person completes, the more positive a person tends to be about immunization.

With the exception of race, ORC researchers found demographic factors to be much less discriminating than interviewees' perceptions of personal susceptibility to disease, seriousness of disease, and vaccine safety (ORC, 1978). At the 95-percent level of confidence, household income was more discriminating than sex, age, or level of education. (See table 4.1 A.) At the 90 percent level, sex was slightly more discriminating than income, age or education.

Vaccine Costs and Health Insurance

The effect of the cost of vaccination for the consumer on the public's use of vaccines has not been assessed in any study published to date. In general, the cost of vaccination is low relative to the costs of many other types of medical procedures. The average fee for administering a vaccine in a private physician's office in 1978 has been estimated by the Office

of Technology Assessment (OTA), to be $6.47 (Schieber, 1976; CMA, 1969).[2] Product costs add another $.50 to $5 per dose, depending on the vaccine (Risky, 1978; Beck, 1978).[3] In a publicly financed immunization program, vaccinations can be performed either free-of-charge or at a reduced cost for the consumer. It should be noted that, while the price of a single vaccination may be low, for large families, the price of a series of vaccinations could be substantial.

The extent to which health insurance carriers pay for vaccinations is unknown. Typically, health insurance plans pay for the costs associated with the diagnosis and treatment of medical problems. Most plans, however, do not pay for the provision of preventive services such as vaccinations.

In the public sector, for example, Medicare, specifically excludes payment for immunizations to prevent disease:[4]

> **Immunizations.—Vaccinations or inoculations are excluded as "immunizations"** unless they are directly related to the treatment of an injury or direct exposure to a disease or condition, such as antirabies treatment, tetanus antitoxin or booster vaccine, botulin antitoxin, antivenin sera, or immune globulin. In the absence of injury or direct exposure, preventive immunization (vaccination or inoculation) against such diseases as smallpox, polio, diphtheria, etc., is not ***covered.*** (Flu injections are administered as a preventive measure and are excluded from coverage without regard to a patient's particular susceptibility to influenza.) In cases where a vaccination or inoculation is excluded from coverage, the entire charge should be denied,
>
> (Medicare *Carriers Manual*, paragraph C, section 2050.5C, 2050 services and supplies, 2050.5 drugs and biological)

Medicaid may or may not pay for immunizations, depending on the discretion of a particular State. Immunizations are not a service mandated by the Federal Government as a condition for State participation in the Medicaid program. Presumably, the Federal Government jointly finances immunizations with those States that include vaccinations in their Medicaid benefit packages. Another federally mandated health program, Early and Periodic Screening, Diagnosis and Treatment (EPSDT), designed to pay for preventive health services for Medicaid beneficiaries under 21 years old, does not pay for immunizations. A program designed to replace EPSDT, the Child Health Assessment Program (CHAP), if enacted by Congress, would pay for immunizations.

The extent of coverage for vaccinations by either commercial health insurance companies or Blue Cross and Blue Shield is not known. According to a Health Insurance Survey in 1977, 20 of the 28 companies responding offered coverage for some types of preventive services (Jones, 1978; Lutins, 1978). No data indicate the percentage of policies or insurers with preventive coverage. Most companies do not cover immunizations (Jones, 1978; Lutins, 1978). Likewise, individual Blue Cross/Blue Shield plans may cover preventive services in some of their contracts, but the number of people with such coverage is unknown (Buckley, 1978; Mitchner, 1978). A Safeco health insurance plan marketed in California and Washington State and the Blue Shield- Blue Cross Plan for New Jersey both include immunizations as services to be covered by primary care providers reimbursed in a prospective capitalization payment mechanism (Fairity, 1978).

The extent to which vaccinations are provided by health maintenance organizations (HMOs) is also unknown. Theoretically, HMOs have financial incentives to immunize their members, because the cost of vaccination usually is much less than the cost of treating a preventable infectious disease. Factors such as turnover of members (due to mobility and choice of plans), however, may reduce the benefits to HMOs of providing immunizations. The Health Maintenance Act Amendments of 1976 mandate the provision of specific preventive services, but the use of vaccines is excluded. An HMO may offer supplemental health services, including vaccinations, at its own discretion.

No major study has examined the effect of insurance coverage on the extent to which people seek vaccination. Results from investigations into the effect of insurance coverage on ambulatory care services (Roemer, 1975) and preventive services (Luft, 1978), however, may help to predict the relationship between insurance coverage and vaccine use. Briefly, these studies show that, in general, insurance coverage positively influences the demand for ambulatory and preventive services. In general, although data are mixed, enrollees in HMOs probably use preventive services more than do those insured in fee-for-service insurance plans (Luft, 1978).

Factors That Can Affect Physicians' Provision of Vaccines

In a discussion of physician-induced demand for medical care, Harvard economist Jerry Green wrote: (Green, 1978)

> Looking for the effects of availability on the utilization of medical resources is similar to tracking the abominable snowman. The evidence is fragmentary,

[2] See ch. 4.

[3] See app. 4.5 for further discussion of the prices of vaccines for public programs and private physicians.

[4] Whether the Medicare law should be amended to permit reimbursement for preventive vaccinations is an issue discussed in ch. 6. Amending the Medicare law is a policy option presented in ch. 7.

and though the search is exciting and fraught with danger, no one is quite sure what to do were the beast ever confronted face to face.

To some, this statement may reflect the state-of-the-art of efforts to explain how and why physicians prescribe the treatments and use the procedures that they do. Just as the behavioral research literature is bountiful with attempts to describe the behavior of health care consumers, it is filled with descriptions of selected physician behaviors. Some researchers offer theories based on economics (Green, 1978); others offer explanations based on professional motives; and still others use explanations driven by malpractice concerns.

Unfortunately, few studies have analyzed the factors that determine physicians' prescribing of vaccines. Certain factors that may influence such behavior are shown in figure 4.lB. The factors shown in this figure are basically the same factors that affect consumers' vaccine-seeking behaviors, but are presented from the perspective of the physician. The first three items reflect concern for a patient's health status; the fourth, concern for the patient's economic status; and the last two, concern for the physician's own liability and economic status.

Factors that physicians may consider in assessing a given patient's need for a particular vaccine include these:

1. The likelihood of the patient's being exposed to a particular disease-producing organism.
2. The patient's vulnerability to the disease once having been exposed to the organism.
3. The extent to which contracting the disease will disrupt the patient's life.

Sometimes, physicians' decisions to vaccinate individuals are mandated. Most States, for example, have mandated the administration of certain vaccines to children entering public schools.[5] Similarly, the Federal Government mandates the use of vaccines for travelers to and from certain countries with endemic diseases.

Evans has theorized that physicians consider the ability of their patients to pay for a medical procedure or use of a technology before prescribing it (Evans, 1974). The effect of this factor on the use of vaccines is not known. The factor may be of minor concern, because of the low cost of vaccines. As discussed above, however, most health insurance carriers do not pay for vaccinations, so in most cases, the cost is assumed directly by the vaccinee.

Physicians derive their knowledge and attitudes about a given disease or a certain vaccine from multiple sources. (See figure 4.1C.) The risks and benefits of vaccination against certain diseases—measles, rubella, diphtheria, mumps, typhoid, polio, and tetanus—have been known for many years. Physicians often learn about vaccination against these diseases in their formal training. In addition, the epidemiology and potential harm of these diseases have been studied for many years, so physicians have large data bases to use in deciding whether or not to vaccinate their patients. For other diseases, such as pneumococcal pneumonia, data bases are limited, and physicians must often speculate about a given patient's risk of contracting the disease and need for vaccination. For data regarding new vaccines, as well as new data regarding old vaccines, physicians rely largely on contemporary sources of information, such as professional literature, Government publications, peers, and vaccine manufacturers. In spite of widespread communications and product advertising among physicians, their acceptance of vaccines, particularly new ones, can be quite slow (Pantell, 1979).

An increased level of awareness about vaccine-related injury (e.g., Guillain-Barre Syndrome (GBS) caused by swine flu vaccine, and polio caused by poliovirus vaccine) possibly has influenced physicians' use of vaccines for two reasons. First, adverse reactions obviously influence the welfare of the vaccinee, and potential injuries may alter the benefit-risk ratio of certain types of vaccinations for some people, at least in the minds of their physicians. New concern about the potential dangers of pertussis (whooping

Figure 4.1 B.— Factors That Can Affect Physicians' Provision of Vaccines

- Attitudes and knowledge about targeted diseases
- Attitudes and knowledge about the safety and efficacy of certain vaccines
- Perceptions about a patient's need for vaccination
- Consideration of a patient's ability to pay for vaccination
- Consideration of revenue generated by vaccination
- Consideration of the potential liability for vaccine-related injury

Figure 4.1C.— **Sources of Information That Physicians Receive About Vaccines**

- Formal medical school and postgraduate training
- Contemporary professional literature and texts
- Peers
- Government publications
- Vaccine manufacturers
- Formal continuing education programs
- Personal experiences of their patients

[5] See table 17 in ch. 5.