

# Communication and Community Development for Health Information: Constructs and Models for Evaluation

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by

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Review prepared for the National Network of Libraries of Medicine

Pacific Northwest Region, Seattle, December, 1997

Introduction:

The perspective of this review is taken from a deceptively simple vantage: community development and communication. In turn, these derivative fields draw from a wide assortment of more established literature encompassing traditional fields such as sociology, telecommunications, informatics, business management and public health.

Our purpose is to suggest variables, methods and techniques - with their associated models - that may lead to better assessment of programs delivering health information to hard-to-reach rural areas and minority communities. The basic organization followed is:

- ∞ *Models* that describe and explain health communication processes in community settings
- ∞ *Inputs* or the components in the community and communication matrix that affect health information outcomes.
- ∞ *Interventions* or "process" such as techniques or strategies that influence and improve the quality of information dissemination and utilization.
- ∞ *Evaluation methodologies* that serve as measures of effect or outcome.
- ∞ *Synthesis* of major characteristics found in our review. We try to isolate main themes to make recommendations for future biomedical information diffusion and assessment.

For each of these categories, we summarize key characteristics and describe major examples.

## Community and Communication

The study of community and communication has a history extending back to the turn of the century. Scholars of then nascent social science such as Dewey and Park<sup>[1]</sup> wondered how mass media could

create unity and commonality among people faced with their increased dispersion in large cities of the industrial revolution or the distant frontier of an unsettled West. A little earlier in the 1890s, the French sociologist, Gabriel Tarde, distinguished *public opinion* as a collective community voice organized in part by media comment.<sup>[2]</sup> By the late 1920s, the idea of communication and community were inseparable. Not only was the daily interaction of citizens essential to collective action, their media served to stimulate and direct it. Many community needs from education to public health became entwined with information technologies and the growing list of agencies with professional and public information mandates.

The concept of community itself has varied understandings across the disciplines that study it. Hillery, for example collected and contrasted some 94 definitions of the term.<sup>[3]</sup> This variety withstanding, he developed three essential components: (a) persons in social interaction; (b) within a geographic area; (c) having one or more additional common ties. Somewhat more elegantly, Bracht referred to a community as " . . . a group of people sharing values and institutions." <sup>[4]</sup> Its components included, " . . . locality, an interdependent social group, interpersonal relationships, and a culture . . ." <sup>[5]</sup> Dewey pointed out the essential nature of communication to these components in that it permitted an intellectual and conscious sustenance of the communal common good. It was and is a necessary prerequisite.

In recent years, the idea of community as a physical place has been discounted somewhat in favor of "virtual" communities.<sup>[6]</sup> The development and spread of interactive, computer-based media have removed the geographical constraints of traditional broadcast and print media.. The internet and direct broadcast satellites are two new cases where distance makes little difference to the information community congregated at their terminals. Thus it is useful to consider that communication doesn't simply support the traditional community, it can alter the very definition itself.

The point of the foregoing is to introduce the importance of telemedicine and medical informatics to this review in addition to more traditional communication fields. As specialties developed in the past two decades, they have accelerated the availability of health information through technology for hard-to-access groups and venues, greatly transforming the economics and potentials of this effort.

#### The Rural and Hard-to-Reach Groups

The other major condition of this review is that it is directed to health communication among disadvantaged peoples in unpopulated areas, such as Native Americans and the rural poor. The reforms over the past decade in US health care have been profound with widespread managed care and federal government re-evaluation of its healthcare role. Rural areas, though touched by such change, have not solved their core healthcare problem: how to " . . . get health care providers and services into rural areas and keep them there." <sup>[7]</sup> Yet these regions are the most needy, having lower incomes, poorer health, higher percentages of elderly, fewer local medical practitioners and lower rates of insurance.<sup>[8]</sup> Rural circumstances militate against good health insurance plans and other funding innovations for the lack of large employers and adequate incomes. Managed health care and multi-provider delivery systems may increasingly concentrate care in larger, more distant facilities in search of economies of scale and surer funding. The outcome, progressively, is a decamping of good health care from rural regions.<sup>[9]</sup>

Would communications technologies reasonably penetrate this growing isolation? Unfortunately, these technologies are also wanting in rural areas. Native Americans (including American Indians, Aleuts and Eskimos) in these venues have proportionally the fewest telephones, the fewest personal computers and least modems for network connectivity. This lack is particularly acute for the young and

very old of these regions.<sup>[10]</sup> While some of this situation is for lack of infrastructure (the adequacy of rural telecommunications wiring and service providers), the core problem traces to costs, incomes and perceived utility of the technology.<sup>[11]</sup> Telephone costs, particularly installation, may be high. Reaching resources may involve toll calls more frequently than for urban residents. Then there is the problem of information "literacy" - how to express needs in terms technologies can help answer.

The situation seems paradoxical: one of the best solutions to rural isolation encounters a series of barriers based on both material and social-psychological issues. As a study for Congress on Native American access to telecommunications concluded:

"Telecommunications technology offers many opportunities to help Native Americans deepen their cultural roots, empower their communities, strengthen Native governments and address daunting challenges such as very high unemployment and poverty rates and poor health conditions. *The promise of telecommunications is by no means assured, however* [emphasis theirs]. Indeed, if Native Americans, collectively, do not gain better understanding and control of this technology, the result could be to further undermine Native culture, community, sovereignty, and self-determination."<sup>[12]</sup>

The interplay of communication technology and its use among the least technologically literate will be a theme in this review.

#### Literature Reviewed:

An eclectic mix of research, review and professional training literature was examined both in traditional and electronic form. Considerable resources on health communication and rural regions exist on the Internet as the possibilities of this technology are readily put to practice as an informational fix to growing rural health care problems. Many rural medical programs are interlinked in this way, variously disseminating medical help, recruiting health professionals seeking to work in rural areas, trading news of telemedicine advances and advertising grant programs.<sup>[13]</sup>

There is much in the traditional communications literature and allied social sciences, particularly in the growing research specialty of health communications. More than two dozen universities offer specialty programs in this field based in the traditional social sciences or schools of communication. Similarly, programs in medical informatics have joined more established departments of public health in many major medical schools. Together, these programs have produced a growing *corpus* of applied research..

Governments, particularly at the federal level in the United States and Canada, have increased their efforts to understand the rapid changes in health care and information by commissioning studies and research reviews. The now disbanded Congressional Office of Technology Assessment (OTA) was particularly useful in its several major reports on rural telecommunications and health care status.

We review literature from the following specialties:

Medical informatics and telemedicine have much to say about "community health information networks" but many paths are followed from this point.<sup>[14, 15]</sup> Patient information and standards for record-keeping is a recurrent concern<sup>[16]</sup> as is medical education for physicians, providing public health and epidemiological data, and promotion of citizen involvement in health issues.<sup>[17]</sup>

Public health considers the widest range of community health communication implications.<sup>[18]</sup> These include technology and scientific information transfer across cultural lines, rural development, patient-provider communication, and support of community health centers.

Communication and mass communication have held eclectic interest in health communication and information. As a derivative fields they borrow their concepts widely from other disciplines, mixing them with ones of their own invention. Having a role in this review are:

- ∞ *Diffusion research* has been a long-standing tradition in communications with its focus upon the hard-to-reach and the difficult-to-educate in remote places of the world..<sup>[19]</sup> Only a portion of this literature makes sense in present times for a developed and mechanized rural United States.
- ∞ *Social marketing* is a newer communication concept that applies advertising and public relations promotional techniques to the alteration of unhealthy behavior, such as smoking, drug use and family abuse.<sup>[20]</sup>
- ∞ *Networks and therapeutic communities* research provide some conceptual basis for family-based mental health intervention and self-help groups like *Weight Watchers*.<sup>[21]</sup>
- ∞ *Community studies* often combine with other approaches, such as diffusion, to "audit" or assess communication among particular community types: ethnic groups, urban poor, recent migrants, etc.<sup>[22]</sup>

The variety of models, variables and interventions available from the foregoing is considerable and far beyond the scope of this paper to treat exhaustively. Rather, attention is placed on what we think are key variables that have been used frequently in prior research, have some demonstrated importance and perhaps have heuristic or conceptual value for future assessment design. The emphasis - judgmentally - is upon those seen as most useful in assessing rural-directed information programs.

### Process Components

In this section we exploit a review of literature for key models, inputs, interventions and outcomes. Later, we examine methodological and evaluation issues.

### Models

It is useful to consider models initially rather than as a concluding stroke; they are an abstraction of relationships in a communication/information process.<sup>[23]</sup> As such, they are a guide to input variables, a description - schematically - of processes and a summary of possible outcomes from community bio-medical information. They direct attention toward relevant inputs and outcomes, and methods of evaluation.

Both the communication literature generally and public health in particular have been rich in generating models. Historically, there has been a progression from postwar years to the present from considering education and change in individuals to that of groups and communities. Most recently, this kind of conceptualization has been spurred by the growth of computer mediated communication, such as with the internet, and the social configurations resulting when distance is not a factor. Some models remain

simple descriptions of process, fixed in time and circumstance of a particular program. In this review, we favor models based on testing *both* project-specific and generalized, conceptual goals.

Models based on Communication and Change:

From study of advertising, journalism, wartime persuasion and education, several important communication processes have been mapped. Drawing largely on the social sciences, useful generalizations, at first rather simple, have grown in complexity to explain effective communication. We review several (below) that offer important concepts and processes.

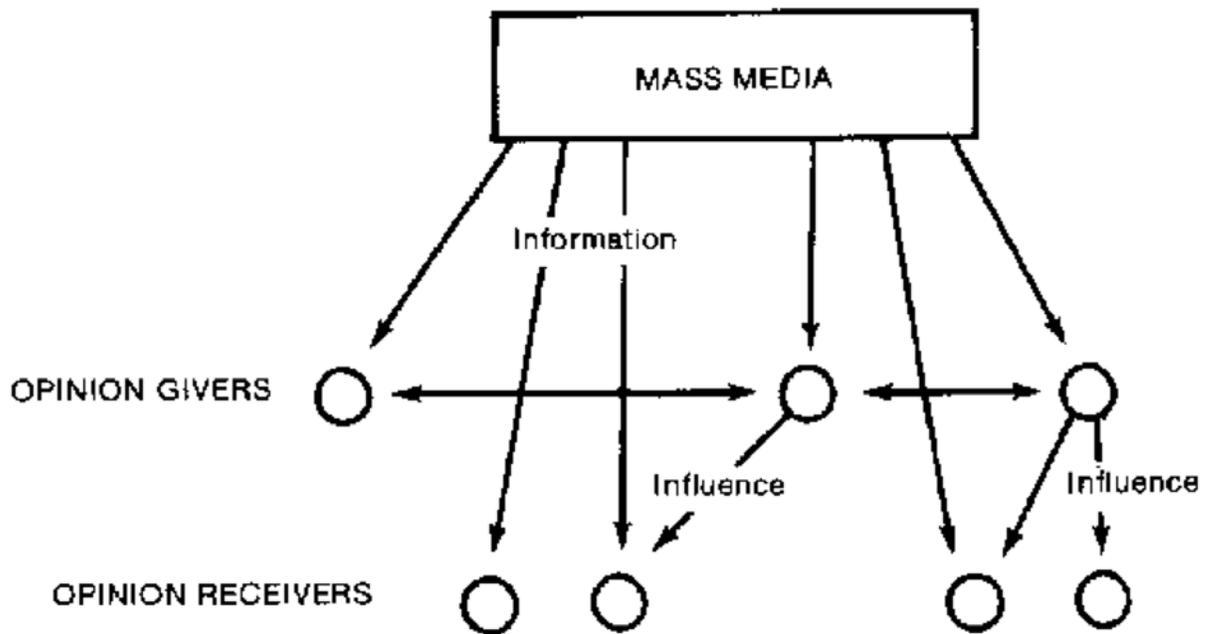
Transmission Models were typical of early postwar thinking about human communication. With roots in engineering and information science, formulations such as the Shannon-Weaver Model<sup>[24]</sup> and Berlo's human communication adaptation of it,<sup>[25]</sup> showed simple, linear information flow from mass media to individuals.<sup>[26]</sup> A metaphor to the telephone equipment originally diagrammed, human communication was pictured as a one way message flow from a source, passed through media channels, "decoded" (semantically) by audiences and applied to daily life. Emphasis rested upon the receptivity of audience members to a mass media or institutional message or simply being exposed to it. Considerations of attitudes, values, belief, basic demographics such as gender, education and social/income class were inputs governing the influence of the communication.

Transmission was popular in the immediate postwar years for conceptualizing mass communication in ways congenial to a commercial media system seeking greater influence upon consumers. Simple and mechanistic, these models served to organize key variables of a burgeoning new medium, television. They are apparent in modern public health studies that examine solely the recall of messages or compliance behavior by the public. Like basic advertising research, the outcomes consist of attitudes, information recall or behaviors compliant with the message. In this aging view, communities and consumers are vessels to be filled and directed by media content.

By the early 1960s, a social component was developed as the Westley-McLean Two Step Flow Model.<sup>[27]</sup> This elaboration recognized the importance of social networks to the dissemination of media information. Intervening the early transmission model's direct path from media or institution to the audience was an interpersonal network of friends and co-workers. These people often were persuasive providers of media information, mixed with their advice and experience. This improvement recognized the complexity in transmission of media information: it is often filtered and promoted through personal influence.

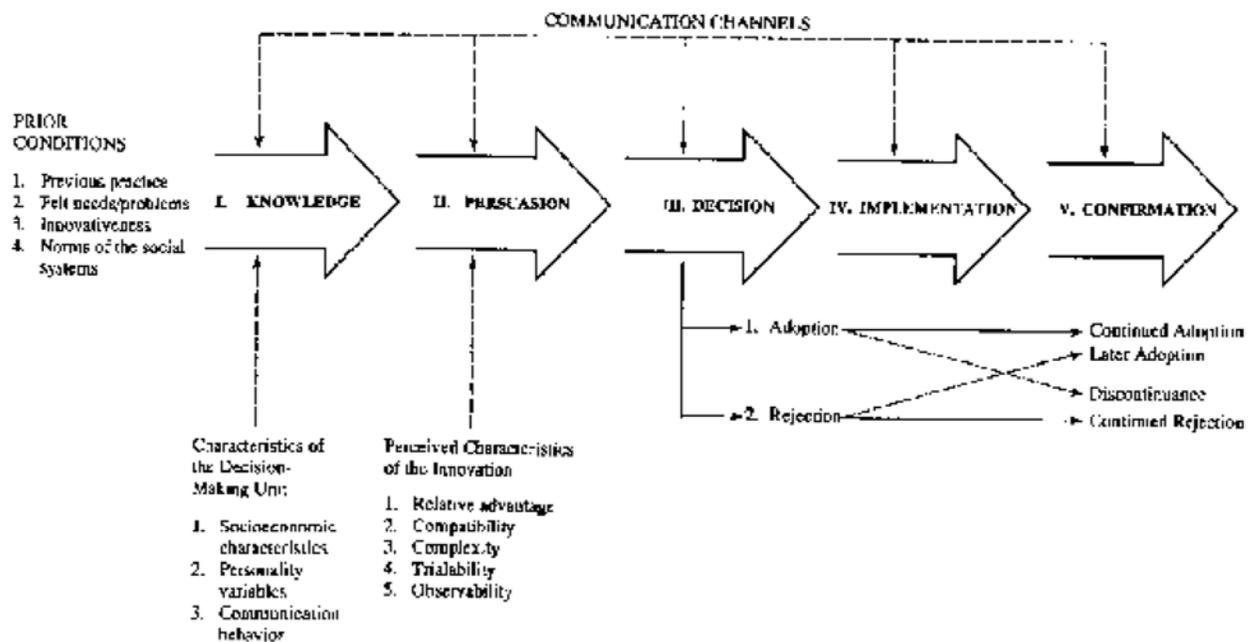
Key in this process are *opinion leaders* who mediate agency or mass media content on behalf of friends and family. Abundant research over the past 40 years attests to the power of these informal "experts" and their ability to amplify (or frustrate) the best of media campaigns. An elaboration by Robinson of the two-step model is shown in figure 1. The activity there is of "opinion givers" discussing media content with each other and with "opinion receivers" who use this filtered content with information directly from the media. The community, thus, is part of media information creation as well as the audience for it.

**Figure 1:** Information and opinion flow shown in revised "two-step" model, from Robinson. <sup>[28]</sup>



Diffusion models, still highly useful 35 years after inception, rest on an individual's decision (and speed) to innovate or adopt a practice. Based on research extending back to the beginning of the century, diffusion research accelerated with postwar international development efforts. First cast for individuals and later expanded to groups, in this process model one moves in

Figure 2: Rogers' Diffusion Model (1995) <sup>[29]</sup>

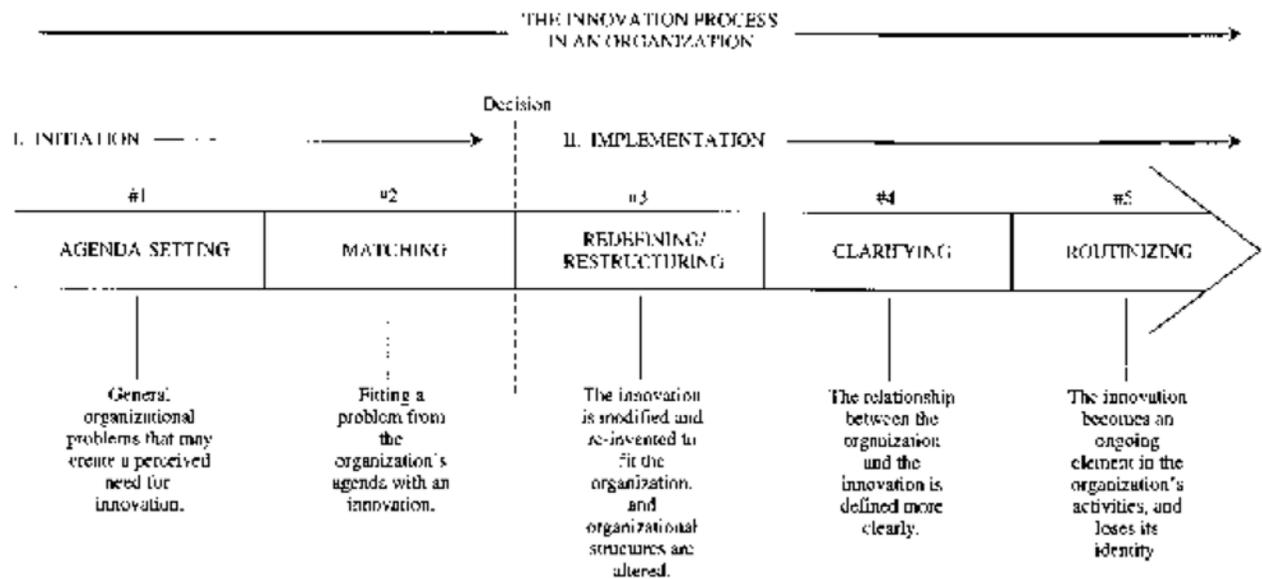


sequence from first awareness to eventual confirmation (or rejection) of the adoption decision. Applied to both individuals and communities, this model has had long and productive application to community health and adoption of biomedical information. From networks of physicians adopting new pharmaceuticals to analyses of seat belt campaigns, the model has provided considerable explanatory worth.<sup>[30, 31]</sup>

Diffusion models have been productively extended to an organizational setting. Though distinct differences mark communities apart from organizations, stages shown in figure 3 resemble those found in processes of decision formation common to community health questions. Issues like water fluoridation, condom distribution, no smoking ordinances and heart disease prevention all have involved community governments either as agents or facilitators.<sup>[32]</sup>

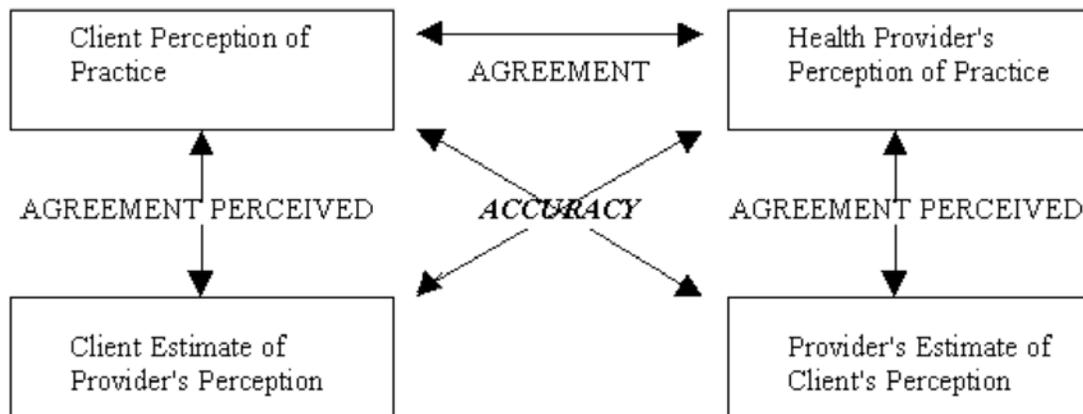
In public opinion processes, such as suggested by Bernard Hennessy,<sup>[33]</sup> collective problems set the community's agenda for action (agenda setting). Discussion ensues - and often argument - about likely solutions (matching). Solutions are adapted and fitted (reinvention). Community support and other responsibilities to the solution are defined (clarifying). The practice ultimately becomes a normal part of community functioning (routinized). With an extensive research base, Rogers' model has adapted well to change - from a focus on the individual to one of social networking and group decision-making.

**Figure 3:** Five stages in organizational innovation, from Rogers.<sup>[34]</sup>



Co-orientation models acknowledge the reciprocal nature of communication common in negotiation and community-based programs where citizen input is a part of fashioning the delivery of expert information. Though originally conceived for interpersonal communication, co-orientation has been extended to group and mass communication situations.<sup>[35, 36]</sup> These models have shown their value in diagnosing "gaps" in information networks. The model is predicated upon contrasting message agreement or compliance with message understanding. To accomplish the latter, the recipient must recognize the differences in ascribed meaning between the source and him/herself.

**Figure 4:** Co-orientation, showing accuracy, agreement and perceived agreement relationships. Arrows show comparisons made.

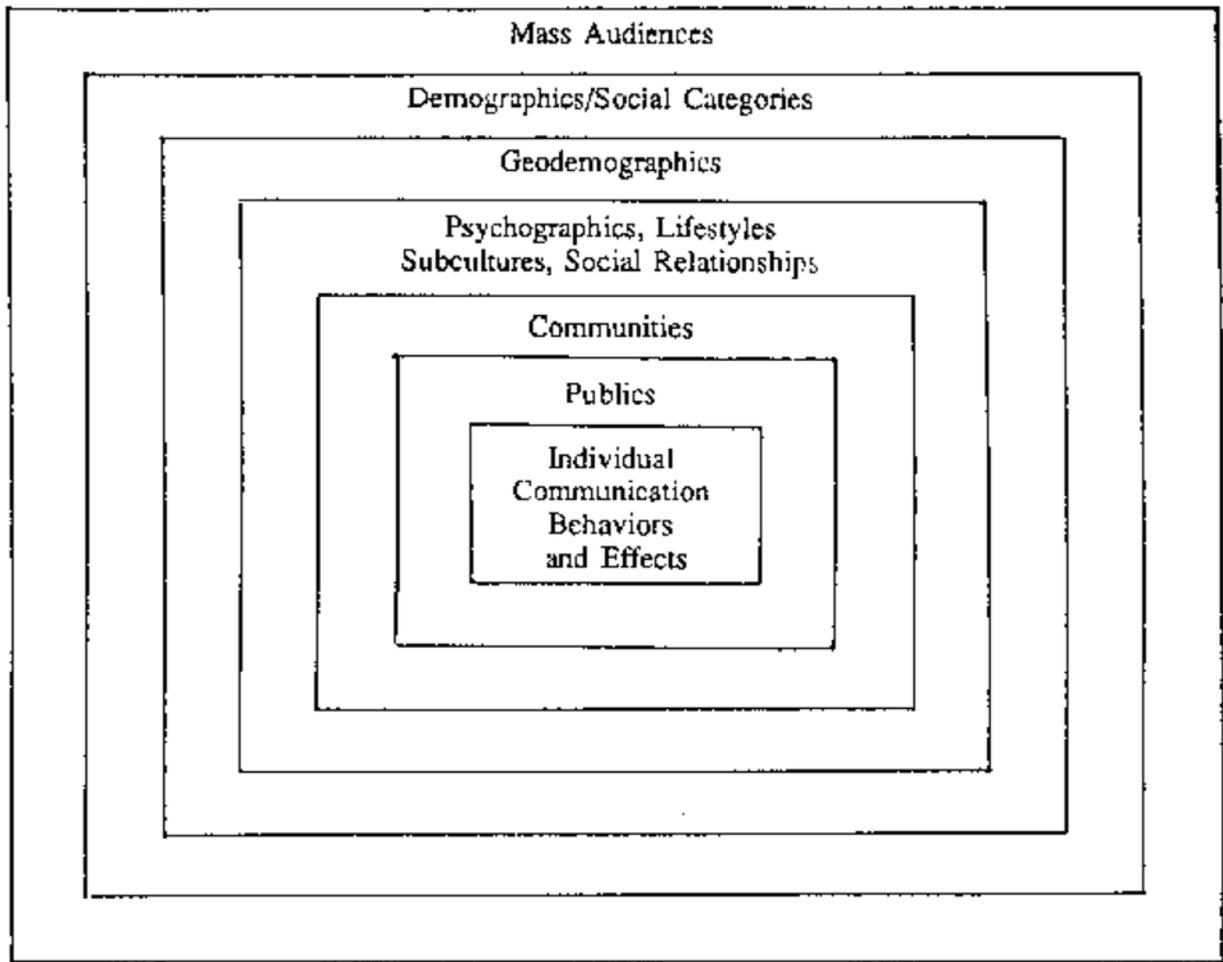


*Accuracy* measures the extent to which each party's estimate coincides with the other's described position or perception. *Agreement* assesses actual overlap in described position. *Agreement perceived* suggests the level of discrepancy or congruence with the other. Though a simple model, it juxtaposes two historically important themes in communication; that of persuasion v. accurate or understood communication. Persuasion seeks agreement of the information client with the agency, often regardless of whether the information is understood. Compliance may be secured under these conditions, but may eventually fail since it is not based on a correct perception of what an agency meant. Irrational or mistaken adoption has often occurred in behavior change or technology transfer campaigns. But discontinuance, dissatisfaction or irrational use may be at high levels. The difference here, in short, is that between short-term *selling* and *teaching* lasting change. The model has tested a number of information diffusion efforts, largely technical information about environmental change.<sup>[37]</sup>

The utility of this model is its diagnostic capacity. Rather than test for message receipt, comprehension or compliance, this model tests mutuality of perception; that the meaning and implication of the message is shared between agency and client - regardless of whether the communication is from agency to client or the reverse. For public health information, the implication is the simple idea that misunderstanding technical information is common; that it is necessary to test what individuals make of it.

*Grunig's Nested Segmentation and Situational Theory:* Grunig's formulation is not a process model, but shows well the *context* in which health information is considered. Each individual has multiple memberships, ranging from active interest groups or *publics* on issues like abortion or AIDS to broad social categories reflecting general lifestyle and ability to understand biomedical information. As one departs from the "inner nests," these memberships become broader, less distinct and less predictive of information effects.

**Figure 5:** Grunig's segmentation. <sup>[38]</sup>



Grunig's key idea is audience *segmentation*. By understanding an individual's membership in communities, publics, subcultures (etc.), the barriers to an information campaign can be anticipated. Of special note are the *inferred* variables of the individual: his or her perceptions, cognitions and attitudes. With these, the researcher can determine if: (a) the audience recognizes a given situation as a problem; (b) whether they are involved in the situation; (c) whether one has a sense of personal control in the situation; and (d) whether they have a solution to offer. If one responds affirmatively to most of this list, they will more likely seek and process information about the situation.<sup>[39]</sup>

To add further complexity, these segments shift with time and situation. The passing of time gradually alters some (one becomes "middle aged"), but situational forces alter others, such as sudden income declines, political shifts and disease (the newly informed HIV + person commonly often sees his or her future rather differently following testing). These shifts affect people's receptivity to messages and their communication behavior, often in a short period of time.

**Summary:** These basic models introduce several important concepts to our discussion.

- ∞ **Process:** Carefully planned communication can bring predictable outcomes in behavior change, knowledge or affect - all without overt force or excessive financial inducement.

*Rational* change, understood and believed in by the community, endures becoming routine and expected.

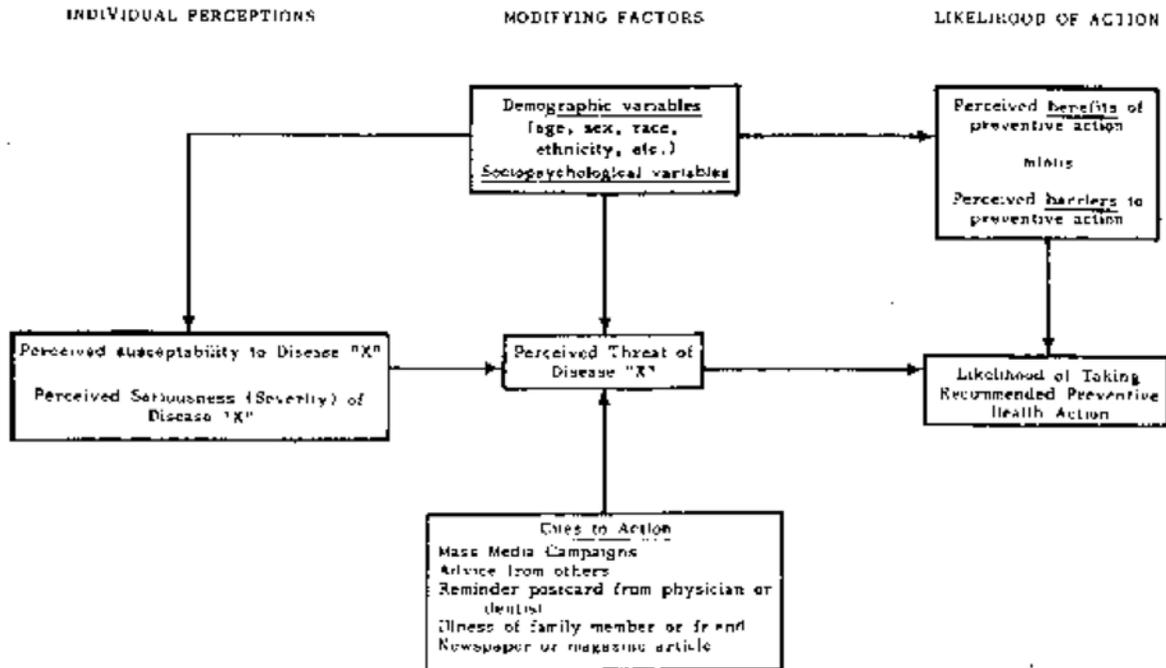
- ∞ **Social networks:** Media information often is retold and spread through networks, giving general information local identity, examples and support. In this process, *opinion leaders* become pivotal agents of change and community adoption.
- ∞ **Reciprocity:** Communication is a reciprocal process; it does not flow irrevocably from a source to an audience, but rather thrives when message builders listen to their clientele, taking in their specific needs, questions and limitations. Key is the level of understanding or *coorientation* among groups involved in change. In this way shared vision and goals are better assured.
- ∞ **Imbeddedness or Context:** Community members (and their behaviors) are imbedded in a hierarchy of linguistic, lifestyle and statutory communities that may constrain and condition whatever the individual may otherwise wish. As commercial message makers have painfully learned, citizens ignore the best-intentioned information when community character has not been basic to a campaign's design.

#### Models Based in Community Health and Education:

Another group of models is more specific to explaining media, community development or health agency communication effects. Our representation is selective by choosing models typifying important processes in biomedical and technical information, which show key variables. Several deserve attention: Social Learning Models and more comprehensive community health education models, such as the Stanford Process and PRECEDE, describe the entire cycle of campaign planning. Though these models have distinct communication elements, they show a more complete process of community health intervention than the former.

Social Learning Models. Traditionally, health education has been grounded in behavior change theories such as the Health Belief Model, the Theory of Reasoned Action and Bandura's Social Learning/Cognitive Theories. Central is the individual's attitude towards adopting health practices.<sup>[40, 41]</sup> In the Health Belief Model, successful campaigns are contingent upon value being placed on a particular outcome (such as longevity) by a person and his estimate of how likely a given health action will produce that outcome.<sup>[42]</sup> Individual perceptions of severity and susceptibility to disease are taken with co-variables, such as demographics, personal information from others and experience with illness, as predictors of taking action.

**Figure 6:** Health Belief Model from Janz & Becker.<sup>[43]</sup>



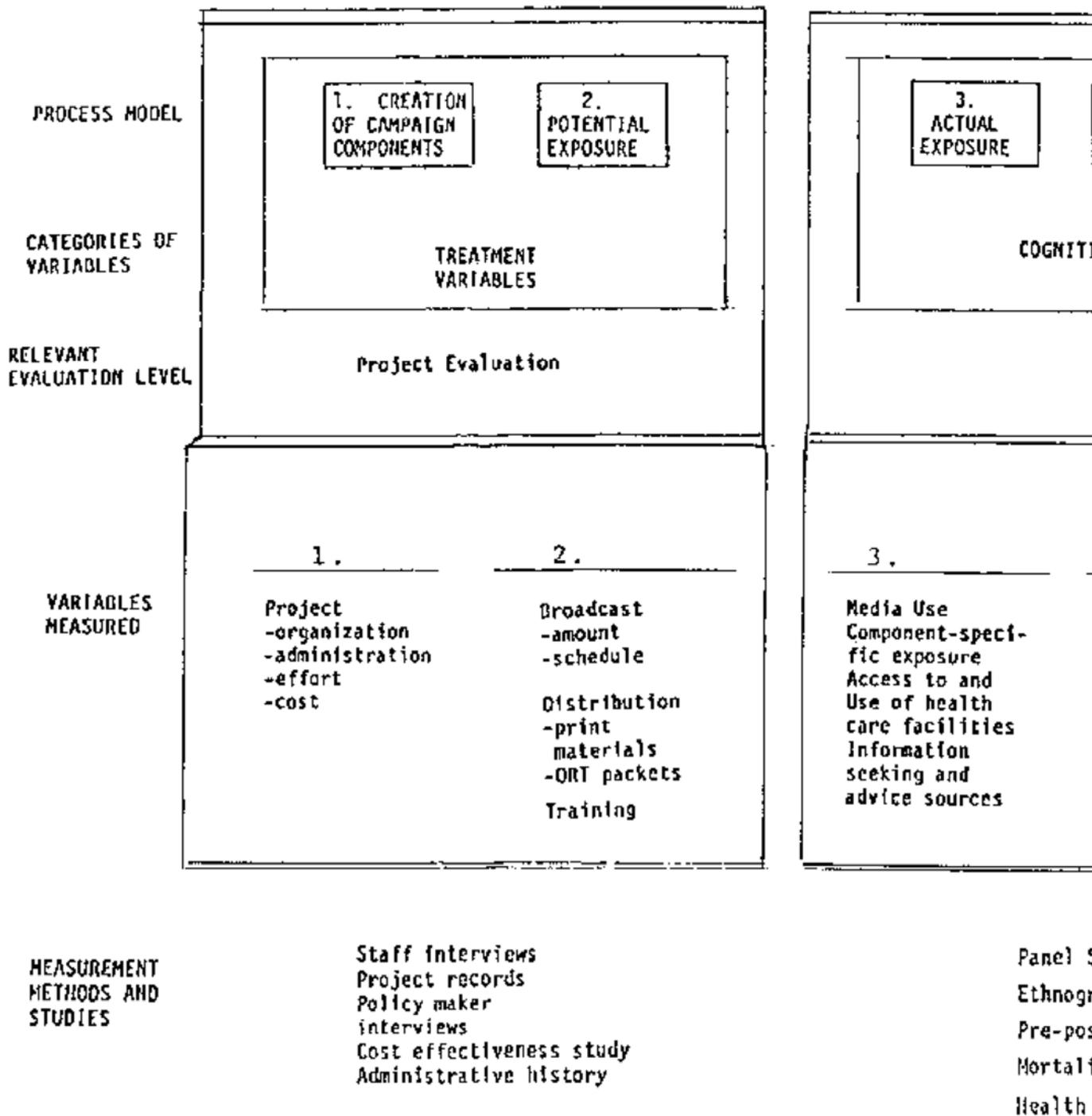
More generally, the social learning paradigm extends this process to learning from the mass media. In examining the harmful effects of televised or cinematic violence, Bandura examined co-variables, such as demographics, personal information from others and illness with other family members, that are "modifying factors" to media influence - a social learning or experiential component.

A key concept is *self-efficacy*, a person's belief about his or her control over one's behavior and motivation in a social environment.<sup>[44]</sup> Related is the idea of *expectation*; that one's behavior materially affects outcomes. Self-effective people see clearly the link of personal actions to outcomes that affect them. In earlier work by Julian Rotter, these individuals were shown to have a sense of internal control in contrast to those who believe that they hold little sway over their future - victims of fate.<sup>[45]</sup>

Later variations added the ideas of "behavioral intention;" that is, the individual's prior behavior, their attitude toward the behavior advocated in the campaign and subjectively held norms.<sup>[46]</sup> These new conditions, though making the model more complex, worked productively to predict outcomes about health risks such as marijuana and alcohol use. The major improvement given, methodologically and conceptually, is a better elaboration of *causal forces* as predisposing beliefs in individual decisions about health behaviors. The major drawback is that there is little consideration of the totality of the health information process at a community level.

The Stanford Process Model is a linear plan for health information on oral rehydration therapy (ORT) and other practices to eliminate infant diarrhea (as PROCOMSI, or *Proyecto de Comunicacion Masiva Aplicada a la Salud Infantil*). Staged in rural Honduras in the 1980s, the plan coordinated an extensive print, broadcast and interpersonal campaign aimed at a narrow set of infant health issues. The knowledge and behavioral change objectives were based in education, social learning and social marketing. "Formative" evaluation allowed systematic development of messages by checking effects at several interim points. The main difference from the previous model is a focus on specific communication inputs and learning rather than prior motivational

Figure 7: The Stanford Process Model, from D. Foote, *et al.*<sup>[47]</sup>

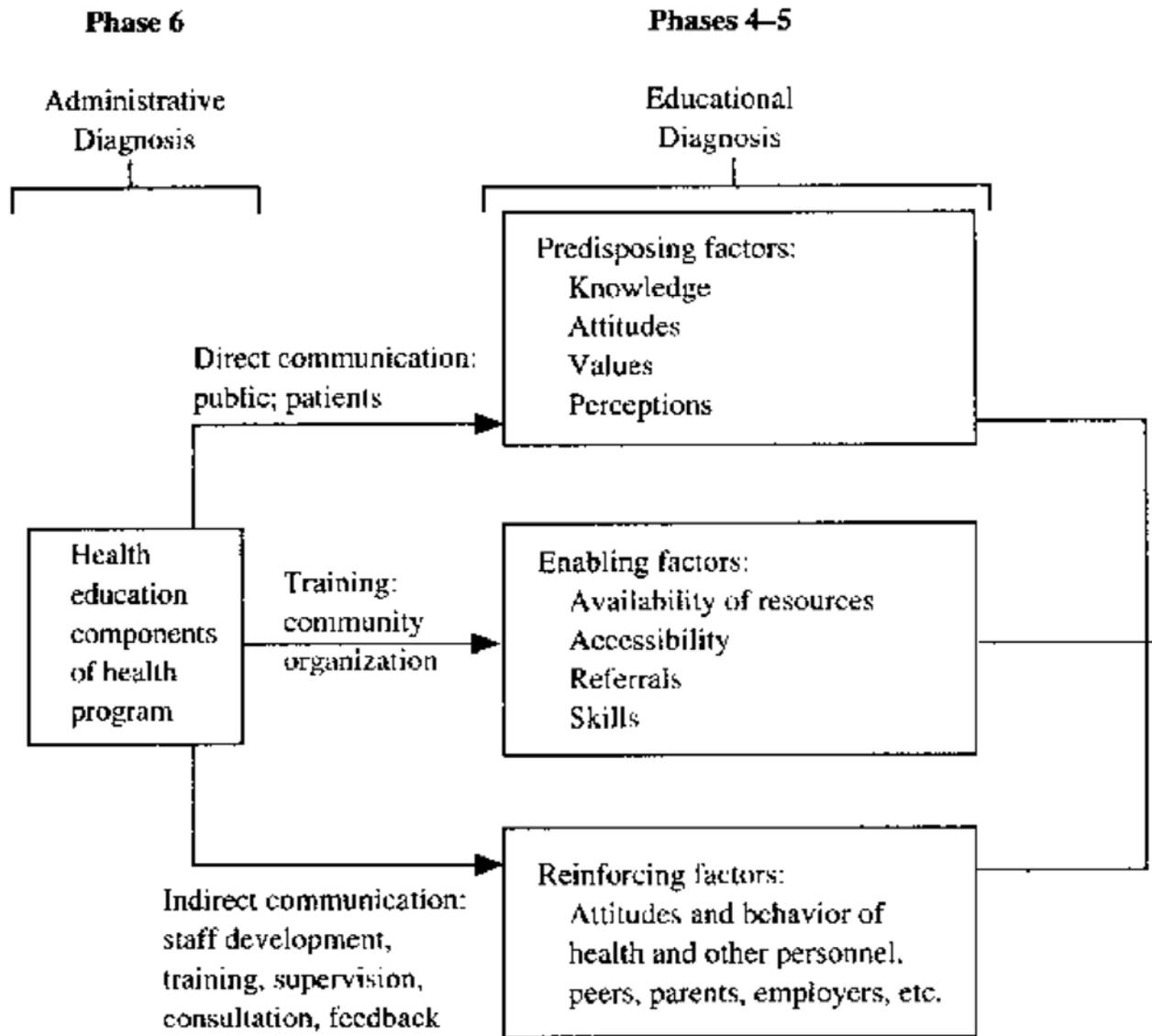


states and perceived self-efficacy. Outcomes are assessed at several points as the campaign unfolds. Near-term effects are message exposure (stage 3), while stages 4 and 5 concern attitude shifts and knowledge gains. End stages look at behaviors showing improved hygiene, infant care and nutritional

practices (stages 6 and 7) and morbidity/mortality (stage 8). Later we discuss the contrast of impacts and outcomes, shown clearly here between near and long-term consequences of the study's interventions. In common with other models (Rogers' Diffusion Model and PRECEDE), there is a movement from message exposure, through cognitive change to behavioral changes and the outcomes they enable.

The PRECEDE Model or "Predisposing, Reinforcing, Enabling Causes in Educational Diagnosis." This complex schematic focuses on organization and diagnostic work. Proceeding from right to left, six phases work backwards causally from social and epidemiological outcomes and social factors through behavioral causes of health problems to (finally) educational and administrative roots. Health communications figures heavily in these last two stages and is elaborated into three components: "direct" communication to the community to promote "predisposing factors" like knowledge and values about health; "indirect" communication to staff who in turn would "reinforce" community health information; and community "training" to "enable" community health information through better local organization. Where communications models are strong on messages, media and audience, this model emphasizes the mutually supportive organization needed to field a major campaign, the goal states desired and the path to them. Above all, this model shifts focus from one largely of educational needs, as in the social learning model, to the social, political, organizational and regulatory issues in community health planning.

Figure 8: PRECEDE model, from Brecken, *et al.*<sup>[48]</sup>



## IMPLEMENTATION

## PROCESS EVALUATION

## IMPACT

The PRECEDE model was later revised by Green (as the PROCEED model). In addition to some streamlining of the earlier work, the author suggests the kind of diagnostic evaluation needed at each stage. These are added in the last text line of the chart and are considered later in this review.

The PATCH Model was developed as a networking and planning model mandated by the *Healthy Communities 2000 Project*.<sup>[49]</sup> Vertical and horizontal communication are encouraged as part of this large public health effort. Vertical communication involves national, state and local "levels" while horizontal ties link government, NGOs and voluntary groups. The goal is to give local voice, participation and focus to what otherwise could be a top-down structure. Commendable as this team

approach is, the model lacks many diagnostic, process and variable identification features found in previous examples.

While these models all have applicability in some ways to rural and hard-to-reach minorities, none are specific to those conditions. Mass communication, by its historical nature, has only lately come to regard audience segmentation and niche programming as essential. With channels numbering in the hundreds, commercial researchers are now seeing value in reaching smaller, better understood audiences. Marketplace pressures, however, direct attention to those likely to spend. The rural poor hold little sway in this reckoning.

**Summary:** These models vary considerably in inclusiveness and complexity, ranging from the basic Health Belief Model to the complexity of PRECEDE with attention to not only the clients of health behavior change, but the institutional and social milieu in which such change arises. In this variety they do have some important commonalities:

- ∞ **Context:** This characteristic includes the community and individual situation prior to an information campaign. Do individuals have the cognitive and linguistic skills to process information? Does the community encourage or constrain change? Are there the institutional structures in place - such as a local health agency - to sustain an information program and interpret it appropriately to target clientele?
- ∞ **Motivation:** This quality examines the proximal causes of attention to information or participation in health care programs. Family or personal experience with disease, fitting a profile of those most disease prone or success with prior campaign efforts are among the positive and negative motivators available. Key is a sense of self efficacy in managing one's health. In absence of this, motivational information may become more a cause for denial and avoidance than compliance.
- ∞ **Intervention:** What does an agency or information source do to affect specific community outcomes? Interventions may be simple (providing oral rehydration mix and community health support) or complex, as in the multi-faceted "heart healthy" community programs described below. Usually, as the scale of interventions increases, there is more attention given to the pre-existing conditions (context and motivation) that assure adoption and continuity of changed community health practices.
- ∞ **Outcomes:** Most studies we have reviewed examine outcomes over the entire process of their creation, going back to the context factors which must sustain the community changes advocated. Perhaps the one locus of difference is between "impact" and true, long-term results such as improvement in mortality statistics. Measuring eventual gains in vital statistics requires a time scale few studies can sustain institutionally or financially. More accessible are what clients say or show they will do in the short term - usually while a campaign is active and its workers are in the field. Less seen (and funded) are field assessments years later to see what persists from a campaign's efforts. Studies will vary in their scope of assessment, perhaps focusing simply on key client behaviors or, alternatively, examining the support and administrative context of the change. Consideration of outcomes, then, is not just a simple measurement issue, but in a real sense calibrates the scope of a study from particular changes in the short term to more encompassing studies of the community over an extended period.

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#### Inputs: Key Variables of the Community - Communication Matrix

The implication of "inputs" is that of presumed causes or preconditions of health communication. In short, these are the independent variables governing the function and outcomes of an information program. While myriad possibilities exist of important or at least situationally useful variables, the accounting below is largely confined to inputs suggested by the models just reviewed. The variables we describe are not meant to be exhaustive; rather they are indicative, typical and important to a given class. *Outcome* variables, the dependencies of inputs and processes, are considered as a separate section.

It should be noted that differences among some variables may be more abstract than real. For example, individual characteristics of community members verge on their collective memberships. Social status both is indicative of individual income, occupation and education as well as group identity - such as being among the childless, married, professional and under 40 years old (the DINK - dual income no kids - or Yuppie).

More confusing is the linkage of observable indicators (education and income, say) with inferred variables such as *innovativeness*, *risk-taking*, and *internalized locus of control*. This frequent problem of drawing conceptual boundaries brings issues of measurement validity which we take-up later. For the moment, it suffices to realize that clean distinctions are difficult in practice and operational confounding is commonplace.

The models we have reviewed have many elements in common. In rough summary, most recognize:

- ∞ *Characteristics of the audience or individual target*: In the late 1950s, simple transmission models were increasingly discarded in favor of more complex ones showing psychological barriers to information.<sup>[50]</sup> Simple formulations may have worked with the clear goals of a wartime America, but as discovered later, not often upon ingrained practices many public health programs address. Smoking, alcoholism and "safer sex" have been resistant to easy alteration, despite extensive programs. Key in this class of variables are:

∞ *Observable Variables*: Income, assets (as property, possessions), age, formal education, functional literacy, occupational status, technical or health knowledge, experience with illness and related issues; media use (gross amount, selectivity, content preference, media channel - e.g. TV, Internet, etc. - preferences).

*Inferred Variables*: Personal efficacy and locus of control or fatalism; risk-taking or attitude toward risk; empathy or role-taking ability; attitudes toward innovation and change; rigidity or dogmatism (unchanging attitudes and lifestyle practices); attitudes toward media (including media credibility); optimism.

- ∞ *Social context: The Individual and Community:* As much as individual barriers to information, social setting and community norms influence message acceptance. These include qualities showing the individual in community and political networks.

Important variables include: cosmopolitaness (as distance traveled and use of experts outside the community); innovativeness (as attitudes toward and as time taken to adopt innovations); social status (as measured by income, occupation), community opinion leadership and position in informal community networks (by sociometric mapping or key informant selection); homophily (or commonality between individuals in a communication network - e.g. shared attitudes, beliefs, culture, etc.); constrained or contingent changes (where community practices or institutions regulate the individual's ability to adopt change); alienation and political efficacy (an extension of *personal* efficacy where one feels capable acting politically in the community).

There is a rich supply of additional elements to consider which distinguish models:

- ∞ *Audience or Community Segmentation:* The social or community context of health information as a nested set of multiple "memberships." The social matrix for citizens is complex and can produce mixed loyalties and inconsistent acceptance of information. In short, affiliations - community, social class, culture and nationality - have impact on how and how well biomedical information is received. Classification schemes exist as extensions of individual characteristics (a *group* of "early adopters," for example) or as profiles which are based on normative patterns (the VALS or "values and lifestyle" segmentation scheme provides distinct classes of consumer purchase profiles and product preferences to marketing experts).<sup>[51]</sup>
- ∞ *Accuracy of information transfer* in contrast to compliance or agreement. We don't mean here just the factual accuracy, but the mutuality of perception among information sources, mediators (such as the press) and consumers. Campaigns that have attained initial compliance may later fail due to what Rogers calls "disenchantment discontinuance."<sup>[52]</sup> Skilled communicators question the consumers of their messages for an impression of how the message is understood. These behaviors are especially hard across distance and cultural divide. There is less common experience and environment to assure success of one's *empathy* as a way of bridging the experiential gaps. Formal strategies to test message transfer, such as tests and questionnaires, may be foiled by language, custom and semantic barriers. Variables include: co-orientation *accuracy* (see above); social *transmission distortion* (distortion in social networks or rumor chains of the kind describe by Shibusani),<sup>[53]</sup> and *semantic issues* when messages must be translated to other languages and cultures.
- ∞ *Message characteristics:* Propagandists realize that their messages will encounter opposition, formal or informal. Similarly (but with more socially responsible goals) community change agents have anticipated the *stasis* of old community habits. What can be built-in to the message structure to anticipate resistance? Much biomedical information is technical and scientific in character. This kind of information is frequently difficult for lay audiences to comprehend and view as personally relevant.<sup>[54]</sup> Important variables affecting this process include: readability (needed language competence to understand); abstractness (reliance on conceptual reasoning); modalities used (whether information is written, aural, visual, etc.); linearity (e.g. traditional text v. hypertext); interactivity (where two-way capability is programmed in).

Message characteristics also may include the kind of appeals or logic to adopt a practice. In communication research during the Second War, there was an understandably preoccupation with persuasive appeals and propaganda. Techniques long taught to high school students, such as *fear appeals*, placed a premium on short term persuasion rather than long-term rational adoption of a practice. Other, more subtle manipulations were developed involving social reinforcement. Use of media forums and community discussion organized by local change agents helped adapt a mass message to community conditions. Though persuasion was still paramount, the interpersonal links gave distant communications a local face and better acceptance. These practices are still used to enhance the effectiveness of rural education programs.

Persuasion goals were overshadowed in the late 1960s by efforts to appeal to audience *uses and gratifications*. This perspective did not necessarily result in a new class of message variables; rather, it emphasized the importance of considering audience desires in designing message strategies. One message approach did not fit all. "Uses and gratifications" brought the simple idea that research was needed to analyze audiences prior to campaigning. As audiences differed, so too would the messages each received. The early imperatives of propaganda were now tempered with the need to appeal to smaller, better-understood audience segments.

Additionally, production qualities are of obvious importance, but are less amenable to easy isolation and quantification. Suffice to say that such judgments rest on aesthetics, production skills, good scripting or writing and so on in a way that is meaningful and compelling to a targeted audience.

- ∞ *Information source characteristics*: The characteristics of the information source are important to community acceptance and credence. Particularly in closed, isolated communities, the cultural fit of "distant" information may be poor. Institutional credibility and past performance are important. Variables include: source credibility (and the dimensions underlying it such as *competence* and *trustworthiness*); homophily (with audience); opinion leadership; centrality to formal and informal communication networks (central and "power" positions afford efficient dissemination of one's messages and control over the passage of others,' respectively).
- ∞ *Media Characteristics*. Particularly with rapid growth of computer mediated networks for health information, these variables take on renewed importance. They deal mainly with media technologies and may arise from software, hardware, or industrial standards. Important variables include: modalities (e.g. text only v. interactive multimedia); symmetry (whether two-way or not); reliability; cost of operation; complexity or difficulty (high complexity excludes many from computer-mediated technologies because of training needed); ease of network access and speed of transmission; bandwidth (the amount of information transmissible in a unit of time); portability; interoperability (can the technology interface easily with other networks and systems); distance insensitivity (costs are stable regardless of source-to-receiver distance); training costs, durability (is the technology failure-prone), and availability of technical support in the field.

- ∞ Newer media technologies often are considered *contingent* innovations, meaning that they have forcing effects throughout a system. For example, the decision to use the internet for rural health communication forces all who wish to participate into a cost/standards structure that brings with it many issues of fiscal support, access, user/staff training and telecommunications infrastructure. This may retard its use. New media also impose new attributes such as *immersiveness* (an enhanced involvement of individuals in an interactive,

- "surround" media environment typical of virtual reality), *mutability* (an ability to change or individualize the form of presentation) and *ubiquity* (a multi-point networked presence).
- ∞ *Change or practice advocated.* Diffusion research, especially, examines the practice or change community health agencies advocate for the problems that may follow. Technically complex innovations, or ones with only gradually visible results, may suffer compared to practices which provide clear, immediate rewards. Rogers advances the following major criteria: relative advantage (the cost/benefit differential of the practice or change); compatibility (fit with existing practices and culture); complexity (difficulty in learning appropriate use); trialability (use on a limited or low-risk basis); and observability (clarity, demonstrability of the idea underlying the change or practice).<sup>[55]</sup>
  
  - ∞ *Community Organization and Networks:* This class of variables adds organizational relationships among groups or institutions involved in a campaign processes. Key are such elements as power or reporting relationships, vertical and horizontal integration (in multiple ways, including communication and bureaucratic linkages), where the decision points and gatekeepers are in the organization (centrality and power), and the quality and regularity of feedback (either top-down, bottom-up or horizontal). Classes of people or groups involved in the modeled process also are critical. Leaving out local administrators or community leaders distorts the process as it may actually operate.

#### Processes or Interventions

Tones, Tilford and Robinson offer the following typology of community health interventions (table 1).

**Table 1:** Typology of community health interventions, from Tones, *et al.* <sup>[56]</sup>

- Type 1** Innovators' goal for the community is primarily self-empowerment and improvement in socio-economic status. Self-empowerment = health.
- Type 2** As above but during the process of developing a community project and identifying felt needs, the community itself acknowledges needs which are consistent with standard preventive medical/health education goals - e.g. need for better primary care services, accident prevention, dealing with child health problems.
- Type 3** Characterized by 'community health projects'. Innovators' goals are to enhance health and prevent disease. They aim to do this by raising the profile of health but are prepared to help the community work through other more pressing 'felt needs' prior to their acknowledging a need to improve cardiovascular health for example.
- Type 4** Innovators' goals are primarily those of preventive medicine. This type is epitomized by the various CHD prevention programmes. It is more 'top-down' than Types 1-3 but it understands the importance of taking the community with it and utilizing existing leadership patterns, etc.
- Type 5** More limited 'out-reach' programmes; limited community participation but uses mix of agencies, e.g. media plus schools, drop-in centres and delivery of services to housing estate or workplace.

Fundamentally, two major dimensions are considered: general community health development where the intervention is used to strengthen *in situ* community resources, and "top-down" focused campaigns that may consult the community, but are otherwise centrally managed. Other dimensions include solo agency programs contrasted to involvement by a mix of agencies and of situations where health is either the sole concern or is among several community development goals.

A goal of community development is the *internalization* of community health practices, ones that will endure when the project ends and field workers withdraw. In contrast, a centrally managed program can possibly *coordinate resources* better and manage complex interventions on a large scale. There

is, however, risk of the community becoming dependent on a project's support and administrative expertise.

What are actual interventions or processes that show promise? These are hard to glean from the skeleton of models. Actual projects better flesh out what is done and what may work. We consider several influential projects below:

*The Stanford Three Community Study:* The TCS study was begun in 1971 and extended through 1975. The purpose was to investigate the influence of large-scale intervention on the knowledge, attitudes and risk-related behaviors in two medium-sized cities.<sup>[57]</sup> Results were compared to an "untreated" control community. Objectives included lowering blood pressure, plasma cholesterol and body weight through increased physical activity, better diet and smoking cessation. Their interventions, summarized, are shown in table 2, below:

**Table 2:** The Health Communication-Behavior Change Model, from Farquahar, *et al.* <sup>[58]</sup>

<i>Communication Inputs</i>	<i>Communication Functions (for the Sender)</i>	<i>Behavior Objectives (for the Receiver)</i>
Media messages	gain attention	become aware
Face-to-face communication	provide information	increase knowledge
Community events	provide incentives	increase motivation
	provide models	learn and practice s
	provide training	take action, assess
	provide cues to action	maintain action, pr
	provide support, self-management skills	self-management
		influence social ne members

The model is based on three core psychological processes with behavioral consequences: (1) cognitive structures or knowledge; (2) affective structures or motivation and (3) action structures or behavior. In a quasi-experimental design, two major interventions were compared. In one community, mass media *alone* were used for coronary heart disease (CHD) reduction. In a comparable community, media were supplemented by face-to-face skills training, incentives and support for high risk participants and their spouses. Media products varied: television and radio spot announcements, newspaper stories, cookbooks, transit posters and health pamphlets. Pilot and pretest studies assured that media products were tailored to local idioms, cultural experience and knowledge. As hypothesized, in treated communities, CHD rates showed improvements compared to the control. Initially, media combined with intensive face-to-face techniques had the strongest effects, followed by

the media-only community. But later, for some measured effects, differences declined between the two experimental towns. For knowledge, media alone seemed to have an effect equal to the combination treatment of media and face-to-face interventions. But others, such as smoking cessation, seemed to *require* the social support, medications and face-to-face communication of the combined condition.

*Stanford Five City Project*: The FCP study differed from the previous in several key respects: there was a greater age range of subjects; objectives included maintenance of the education program as a goal; the study had an extensive "community mobilization" component; and community heart attack and stroke (CHD/CVD) rates were monitored. These changes and a 14 year study duration (begun in 1978) attempted to enhance the generality of the previous work. Again, a quasi-experimental design was used, but in five communities to afford a greater number of control comparisons for testing threats to internal validity. Both cross-sectional surveys and cohort panel surveys were used for data collection. Variables assessed included communication, psychological, behavioral, physical, and physiological indicators.<sup>[59]</sup>

Flora, Maccoby and Farquahar in their review of these studies offer three "primary principles."<sup>[60]</sup>

- ∞ Combining of planned, long-term media campaigns with a variety of interventions (PSAs, contests, self-help materials) to influence multiple levels in the community (e.g. individuals, networks and organizations).
- ∞ The Stanford Studies are theory-guided, allowing a harnessing of prior research in an organized manner in all phases: implementation, social marketing and evaluation.
- ∞ Staged development activities. By planned sequencing of problem identification, planning, implementation and evaluation, successful interventions could be clearly identified.

*The Minnesota Heart Health Program*: Though the medical goals of the Minnesota program were nearly identical to the Stanford studies, its emphasis on strengthening community infrastructure was different. A three step plan was used: the research team's "community analysis" first identified community and special interest leaders to serve on advisory boards and become involved in training. "Task forces" then were constituted to develop strategies and influence the community. The final phase took place with "social system support" and the movement of task force member into schools, unions, clubs and churches. In practical terms, this meant a varied repertoire of techniques - from food labeling in supermarkets and restaurants as "heart healthy," to favorable employer insurance rates for employees complying with low risk behaviors, and improved opportunities for physical activity in all age groups.

In general terms, the key design feature in the MHHP is pervasive and tight community integration in multiple places and circumstances. While there was an imposed structure in planning and development (the task forces), delivery of interventions was by neighbors in familiar places and social settings. The study's sponsors wanted involvement where citizens and communities easily identify with a movement and "take responsibility jointly with health professionals . . . for making decisions and carrying out activities."<sup>[61]</sup> The researchers believe the programs they started, because of deep community involvement, will persist long after the study is concluded.

*The Pawtucket Heart Health Program*: This program closely resembles the MHHP in its interventions, seeking a blend of top-down imposed planning and grass-roots citizen participation. As before, the

point was a seamless integration of heart healthy practices in routine life of the community. To promote this, there were four "social action" principles for designing interventions:<sup>[62]</sup>

- ∞ Use local leadership, e.g. a "volunteer delivery system" This assists peer support, provides homophily between message sources and clientele, aids diffusion in informal networks and so on.
- ∞ Use inexpensive resources and facilities, enabling the program to continue ones project funding stops
- ∞ Emphasis on interpersonal education, with media used for "awareness-raising."
- ∞ Multiple program elements aimed (variously) at individuals, small groups, organizations and the community.

The project reported significant gains in community weight reduction, improved hypertension levels and program participation.

Other Projects: There are other projects deserving of mention. The *North Karelia Project* (Finland) had the same goals as the CHD reduction projects just described, but its European context was reflected in its ability to coordinate schools, the national health service and provide direct aid. With considerable government resources at hand, interventions could be large scale and be sustained.<sup>[63]</sup> Similar in some respects was the *Forty Family Pilot Study*, a broad development effort for improvement of health care along with the social and economic well-being of remote Alaskan communities.<sup>[64]</sup> As in North Karelia, substantial interventions were made by government agencies, impacting not only health, but income, housing, employment and general education. In both, citizen organization and input were present, but much less dominant than in the interventions discussed previously. Despite their "top-down" character, reported results have been impressive.

What can be drawn in common from this group of studies with particular relevance for rural and minority groups?

- ∞ *Indigenous or local support.* Use of local change agents and social organization assured integration of health information and practices into routine daily living. The value of homophily was widely acknowledged.
- ∞ *Multiple sources.* Use of mass and interpersonal sources provided contrasting forms of the same information.
- ∞ *Participatory management.* While varying in the level of citizen control, most programs had both organized and informal input from their clients.
- ∞ *Active feedback and intermediate goals.* Progress could be gauged on multiple criteria at several points in the life of the project.
- ∞ *Use of in-place organizations* such as schools, hospitals, libraries and media. Established information sources in the community were enlisted for programs rather than being supplanted by new, alternative groups or media.

- ∞ *Leadership training.* Either as "task groups" or "change agents," local leaders were typically given training to improve their knowledge and effectiveness as part of a program.
- ∞ *Theory-based.* In contrast to programs based on prescriptive media promotion or community development, these campaign interventions drew upon research in communication, diffusion, education and public health. Social marketing and social learning were common conceptual models. This basis provides cumulative knowledge to inform future programs with tested generalizations.
- ∞ *Clear outcome measures.* Whether inferred, observable or artifactual, outcomes and measures were built into all programs. These are considered in more detail, next.

#### Outcomes, Evaluation and Methodological Issues:

In studies we reviewed, considerable attention is given to outcomes. Outcomes are, after all, the expensive "deliverables" of years of work measuring improvement in the health and health awareness of citizens. In 1987, an *ad hoc* work group of the American Public Health Association, collaborating with the Center for Health promotion and Education of the Centers for Disease Control, developed five criteria for health promotion and education programs, including that ". . . a health promotion program should be organized, planned, and implemented in such a way that its operation and effects can be evaluated."<sup>[65]</sup> Funding agencies, increasingly, are requiring up to 15% of budgets be devoted to formal evaluation of sponsored programs.

Israel, *et al.* develop five major conceptual design issues shown in table 3. A key point is that evaluation is not confined to the final outcomes of a program. Indeed, as suggested in the Green's PRECEDE model, evaluation is recurrent through the life of a project, beginning with a pre-program needs assessment. Critical, as the table indicates, are choices about who should be queried and in what detail about what. What are criteria to be met, if any? Is a mandated level of improvement in, say, awareness to be set as a goal? Or is the assessment compared to what would be if there was no program? Are assessments quantitative, measurable or qualitative comments about well-being? Taken together, these give assessment a high order of complexity.

**Table 3:** Design issues for outcomes evaluation, from Israel, *et al.* <sup>[66]</sup>

Issue	Sample Options and Considerations
1. Who are the primary stakeholders/interest groups/domains for the evaluation?	Policymakers, administrators, health educators, participants, community at large
2. What is the primary purpose of the evaluation?	Context, process, impact, outcome
3. Who needs to be included in the evaluation process?	Internal evaluator, external evaluator, stakeholders
4. What is the focus of the evaluation? What are the primary evaluation questions to be examined?	Breadth versus depth, trade-offs (e.g., examine a few questions at great depth or many questions at less depth; examine all parts, outcomes, and participants or only some subset)
5. What political considerations need to be taken into account?	Stakeholders, context

Commonly, comprehensive evaluations, such as shown in the PRECEDE models and the Stanford Projects, have four parts (below). Smaller studies may have perhaps one or two:

- ∞ *Context Evaluation* refers to naturally occurring events, influences and changes in the project setting or environment that may affect the outcome. In experimental work, these would be exogenous influences that may interact with the study's main conditions, confounding their relationships to outcomes. Methodologically, the obvious correctives are two: In the first case, one develops a list of context factors affecting the study's outcome, measures them and *statistically controls* them. In the second case, treatment conditions are matched in such a way that biases are similar in both, essentially an *experimental control*.

∞ The Stanford Five City Study was in part a replication of earlier work to provide better controls. In one comparison, print media coverage was equated through using two towns sharing the same newspaper. Editorial differences were thus equated. Obviously, no study can hope to control the myriad contaminants likely to bias outcomes. The best that can be done is a judicious selection based on past experience and adroit design choices, such as good matching of experimental and control communities.

- ∞ *Process Evaluation* considers the *quality* of interventions. What are the interventions and the quality of their delivery? How well did the program operate? What materials were provided to participants? How did staff and participants/clients interact? Careful work here allows administrators to later determine why learning strategies and activities worked. As Israel *et al.* comment,

"Much emphasis in evaluation has been placed upon assessing impact and outcomes . . . often resulting in knowledge about whether objectives of a program were met, but not about what produced those observed outcomes."<sup>[67]</sup>

Process data, thus, are most useful when analyzed together with outcome data. Recognition in the Stanford Three City Study that smoking cessation benefited from social support in combination with media information probably could not have been clearly gleaned from examining outcome differences among treatment groups alone. A qualitative feel for what participants were experiencing as learned in a process evaluation likely gave the needed insight for this important conclusion.

- ∞ *Impact and Outcome Evaluation* are both assessments of a program's "outputs." In impact evaluation, one assesses success in making desired changes in targeted individuals, such as knowledge, attitudes, values and behaviors. These developments are usually proximal to the time of the study, with project staff and participants accessible. The emphasis is on what intervention is trying to *directly* alter. It precedes outcome evaluation.

Outcomes are the final goal conditions of the study, perhaps reduction of coronary heart disease and deaths. These may be years away from being known. Analyzing impacts may provide valuable indicators that are decidedly more timely. Sometimes the goals of a study are simply too distant to be assessed by any other than intermediate "impact" indicators.

An example may help. Many CHD information studies measure attitudes and attitude change toward "heart healthy" practices to see if information has had its intended effect upon participants. Over time, however, statistics will be kept on aggregate indicators of community health such as CHD/CVD rates and mortality. A successful shift in attitudes close to the time of the study would suggest a positive "impact." With time, a lowering of CHD/CVD rates compared with control towns would suggest a positive "outcome." A short term studies' proof of performance may rest largely on impacts, while long term programs, such as the Stanford Studies, have the time (and funding) to assess true outcomes.

Outcome Indicators: Taking impacts and outcomes together, they organize into several distinct classes:

- ∞ *Observed Indicators:* These are the visible impacts from information programs in behavioral or material terms. They may include new community practices such as better infant care or hygiene, dietary changes in response to "heart healthy" menu suggestions, visible aspects of stress or anger management, use of "safer" sex practices, clinic visits, competent self-care, improved housing, use of needle exchange programs or "compliance" with medical instructions. These variables may be discrete - measured as to absence or presence - or may be assessed on a continuous gradient as rate/frequency, duration or persistence, range (as in use of single or combined therapies), earliness (as in innovation studies), or quality.
- ∞ *Inferred Indicators:* These are presumed changes in individual attitudes and beliefs based on an intervention program. Aggregated, with appropriate statistical reduction, these may be offered as *community* opinion as well. These outcomes are inferred since they are accessed only by participants' self-reporting or observers' comments. Assessment may be *quantitative* as shown in numerous scaling and indexing techniques (attitude scales, personal health inventories, for example) available to the prepared social scientist. Simple, factual testing for "knowledge" of program practices is common.

∞ Assessment may also be *qualitative*, based on the impressionistic reports of trained observers, key informants such as community leaders, or diary accounts and focus interviews of participants.

In main, the indicators prevailing in this review are relevant to inferred states such as: learning, motivation, self-efficacy, satisfaction, community participation, and perceptions of improved life and mental health.

∞ *Artifactual or Aggregate Indicators*: These are often the true, long-term outcome indicators. Included are vital statistics showing mortality and morbidity, public health trends in disease incidence and disability, and general population demographic shifts such as changes in birth rate, employment, absenteeism and violent crime. Insurance claims, prescription drug records, hospital admissions and related statistics constitute other valuable sources of secondary data in public health.

*Methodological Issues*: In any systematic social science endeavor, there are always measurement and methodology problems. Good studies really are judicious compromises of a number of countervailing forces, ranging from cost limitations to the ambitiousness of the program's agenda. It is well beyond this review to provide a catalogue of such issues; rather, our focus is upon major questions and problems reported in the kinds of studies described above. Israel *et al.* provided a particularly well organized discussion of methodological problems in evaluating health education programs.<sup>[68]</sup> Major issues include:

∞ *Internal Validity*: Large projects such as the Stanford Three and Five Cities studies had the resources for the control groups needed for quasi-experimental designs. Even then, many questions arose concerning the equivalence of control groups and the consistency of treatments in "experimental" communities. Field experiments such as these are enormously expensive and challenging to control. Questions of cross group contamination, the influence of confounding contemporaneous events arising in the test communities beyond the control of the study, self selection bias in those who agreed to participate or report are some of the difficulties - in spite of stringent directives and active monitoring. Did they invalidate the studies? Unlikely. But they did partly motivate a second effort (the Five Cities study) and required extensive statistical work to test for contamination. These seem the normal costs of a well-managed study.

∞ *Randomization, Bias and Representation*: The inferences made in health education field studies depend on randomization to assure stable estimation of error. Health education frequently involves the asking of highly personal questions (such as IV drug use) or the selection of samples from stigmatized populations (such HIV + gay men). Refusals to participate may be high and accurate enumeration of populations is often foiled by concealment. Rural regions present specific, costly problems in enumeration and access due to distances and inferior listings. One must also consider the representativeness of test towns. Do medium-sized California cities (as used in the Stanford CHD studies) act well as proxies for cardiac care instruction to rural Native Americans? Are their findings suggestive or useful? Perhaps. But culture, language and local customs play important roles in health practices, conditioning the advice of even the best managed mainstream city research.

∞ *Samples Used*: The expense, time commitment and management overhead of health information studies can constrain their scope both in time and numbers. Are there enough

- families, participants and communities on which to base generalizations? Were the forty families in the Alaska Family Pilot Study enough? Qualitative researchers may sacrifice predictive stability of large numbers of interviewees for intensity and depth of observation done with a comparative few.
- ∞ *Study Duration and Persistence of Effects:* Will the infant health program in the Honduras last after project resources and media attention are withdrawn? How much time is needed to see clearly trends in health knowledge and outcomes? These needs must compete against an often strained study budget. The extended time frame of the Stanford Five Cities Project is the exception.
  - ∞ *Measurement Strategy:* Most of the studies we have discussed are based in quantitative social science. While there were some qualitative elements, they were minor compared to the use of quantitative, scientific methodologies. In public health, issues of representativeness and defensible numbers are highly important given research traditions and government accountability imperatives. Qualitative methods provide texture and detail often missing in large field studies. What is lacking in coverage may be compensated for in depth and intensity. Issues of cultural tradition, folklore, superstition and non-scientific belief may figure largely in health practices of rural and ethnic minorities - even in a comparatively developed United States.
  - ∞ *Reactive Effects:* By their very nature, active assessments of inferred or observed variables are intrusive: community participants complete questionnaires or personal interviews asking about potentially embarrassing personal health practices or are tested for knowledge levels. Observed variables usually require a trained, outside observer, an especially notable presence in rural and minority communities where strangers are sometimes viewed with suspicion and apprehension. Respondents' behaviors or responses may yield to subtle pressure of investigators. "Courtesy bias," characteristic of some third world respondents, arises from a need to please high status visitors with agreeable conversation. What better way to satisfy that to feign conformity to a study's goals? The only assessments somewhat free of these influences are from artifactual data or vital statistics. Their collection is usually removed in time, purpose and place from the study itself.
  - ∞ *Causation:* Process models by definition show causal relationships. Yet, causality is often difficult to disentangle from *concurrent* or *reciprocal* development. Conceptually, classes of variables can be seen to precede and perhaps "cause" others later to change. Others proceed at the same time; stages in models often proceed simultaneously. Changed health attitudes many lead to information seeking by participants - and the reverse. Values and attendant attitudes by definition precede, perhaps over years, a given intervention. Yet attitudes are transformed by participation in studies, even when health practices advocated may be initially contrary to expectations. Too, the values and norms of a community may inform and modify the goals of an intervention making unclear the direction of influence. The growing importance of community involvement in program design and evaluation is formal recognition that target communities are not empty vessels to be filled by health communications. Rather, communities increasingly interact with and change the programs initially conceived to change them. Qualitative assessment methods often are better at capturing these vital nuances than experiment and statistical quantification.

### **Synthesis and Recommendations for the NNLM**

The communication and community literature is far richer in its consideration of white Middle America or of remote third world peoples than it is of North America's own rural minorities. We must often rely on advice from examples that don't fit our target population well. From this thin research base, we may strain to see implications for improving delivery of biomedical information available from the National Libraries of Medicine: a rich, technical database of high utility to medical research but more distant from the common problems of community health interventions. The effort is necessary, nevertheless, to develop the best extensions possible to rural Native American communities.

The central problem, we argue, is to translate the advice of a research library to the daily needs of distant consumers who may be low in scientific or technical knowledge, but highly in need of practical health advice suited to their lifestyle. The rural health paraprofessional may be the best opportunity to refashion this advice to practical in-service solutions. To effect this, an exchange is needed. NNLM personnel can learn those community health needs that are informational, then determine if the "answers" are available in their collections. Community agents could better learn how to locate needed information in the NNLM system (and the expert human help they may need), in effect translating their questions into forms the system can answer.

But this is a more complex transaction than this quick sketch suggests. Consider several likely steps to using NNLM information, beginning with a community health problem:

**Table 5:** Steps or process of NNLM information transfer.

<b>Community Health Problem</b>	<b>Components of Problem:</b>	<b>Mediating Personnel</b>	<b>NNLM Access</b>	<b>Efficacy, Resolution</b>
- articulation - awareness - recognition	- orientational - informational - contingency - resources (human, financial) - constraints	- community paraprofessional - NNLM liaison	- technological - homophilous personnel - two-way communication	- rework info for community - assessment & follow-up

To elaborate:

**Problems:** The ability to state a need as a "problem" is not automatic. Psychological discomfort, physical illness and feelings of neglect may be potent in a community, but may not yet be crystallized as an "action" item for local institutions. Until a problem can be described, communicated and achieves some collective recognition, it likely won't be recognized beyond an individual's sense of apprehension.

**Problem Components:** Problem orientation speaks to how a problem is framed. Alcoholism, for example, can be seen as a medical problem, a family or social problem, an individual moral problem,

or a community safety problem. How it is handled differs according to orientation. The police perspective differs markedly from the medical.

Is the problem even seen as one of information? Useful medical information may not germinate solutions if problems are perceived as a lack of resources, general education or traditional values. What can mere research information do to overcome these potent obstacles? Moreover, if community institutions deny problems exist or cannot speak to socially sensitive ones (such taboos as AIDS, drug use and promiscuous sex), a solution is "constrained" in the sense that unresponsive community institutions may frustrate individuals' efforts to cope. However fearful one is about alcohol abuse by children, if the community refuses to effectively enforce drinking age rules, there's little hope for individual efforts.

Constraint may be profoundly psychological. Much in the literature we review speaks to an individual's internalized sense of control, that one's behavior materially affects health outcomes. If this relationship is not seen, outcomes are perceived as a matter of chance or fate - sapping any motive for attending information designed to improve health. Of what use would it be?

Other problems are contingent; they require an encompassing, broad cooperation to work a solution. Community-wide dietary changes, for example, oblige suppliers, sellers and preparers of food to cooperate. They are all part of a system of provision that needs informal agreement on goals to operate.

Resources also play. "Heart healthy" diets may require more expensive, nutritious foods. Effective diabetes control, for example, may need persistent monitoring of blood sugar, test kits and drugs, costing in both human and cash resources. Informational solutions do not exist in a vacuum, satisfied only by timely provision of research data. Cash, social and human services, and education may be equally essential accompaniments.

**Mediating Personnel:** Who actually forms the liaison between expert information and the rural user? The wealth of diffusion research suggests that these individuals be similar in outlook and culture (e.g. "homophilous") to those they serve. Yet the very technology that accelerates a cost-efficient presence of a medical library in rural venues forces a stark contrast of urban high-tech medical libraries to the village clinic, putting them virtually side-by-side. While the technology may permit rapid communication between them, will the participants know what to say? The solution may be a long process of training field workers to use NNLM products, and - perhaps more difficult - refashioning NNLM data to better suit field conditions. Mediators need a high level of empathy, an ability to psychologically span the gaps of venue, education and culture that mark research library experts apart from a distant, rural community and its healthcare personnel.

**NNLM Access:** Both the technology and personnel deployment of the NNLM play important roles. Computer-mediated libraries are commonplace, but prosper where telecommunications infrastructures are modern and economically accessed. The distances and low population densities of rural regions frustrate this. As well, access means the human resources to accommodate inexpert patrons and to translate community needs in terms addressable by an NNLM research archive. Our sense is that this human bridge must be highly attentive to learning the structure and folkways of distant Native American communities, developing into a two-way information flow where community comment is given careful attention. Too little is known otherwise to allow for good *a priori* assumptions and set programs that follow.

Efficacy: Only with carefully chosen criteria and regular assessment can the efficacy of NNLM efforts be charted. Long-term outcome analysis is the gold standard of health information: does it improve lives in real, measurable terms? But proximal indicators of *process* and *impact* evaluation are needed to calibrate and manage expensive outreach programs. We believe mediating personnel are the mineshaft canaries of this process, those most sensitive to its success or failure. So while criteria and the validity of assessment strategies may pose complexities, the key "bridge" personnel usually can be identified with some ease.

What should be considered as hallmarks of short-term efficacy? From a communication and community perspective, there are several we suggest:

- ∞ Measurable consequences from NNLM information through its incorporation in community health practices. These outcomes can be attitudinal (favoring a healthy diet, for example), behavioral (eating better foods) and institutional (the school lunch menu is altered favorably).
- ∞ Active discussion and dissemination of NNLM information in community organizations and informal groups. This transmissive process gives remote information local identity, validation and practical examples. Is NNLM information translated effectively into locally compatible language and practices?
- ∞ Awareness and support of community leadership, formal and informal for NNLM activities. Traditional communities often give great respect to the patriarchy of family and village elders. Native institutions, carrying out functions from police and ambulance to emergency telecommunications, have their own leadership and dependent bureaucracy. For success, both kinds of leadership need to embrace health practices and the information delivery system sustaining them.
- ∞ Awareness of and attitudes towards NNLM outreach personnel. There is considerable human chemistry in effective liaisons across cultural gaps. The often invoked qualities of homophily and empathy have a long measurement history that can be useful in making this assessment.
- ∞ Subjective awareness of change and improvement. Essential to a program's success is the recognition of this fact throughout a community. As Rogers' work notes, a key quality to continuance of a new practice is *visibility* of its effects. Health practices often have low visibility. Quick changes in "feeling better" are rare. But once noted, positive changes are a considerable incentive to return to the provider of change information. Such perceptions are of obvious importance among community health paraprofessionals.
- ∞ Coordination of resources. Information is but one piece in a complex mosaic of improved community health. If a community recognizes the value of biomedical information, it should make institutional accommodation for it, providing it resources proportional to its perceived value. Are community health workers given release time and support for learning NNLM navigation skills? Does community government sponsor public health efforts based on NNLM information? Is space and maintenance accorded to terminal equipment? Are citizen questions effectively linked to NNLM resources? These may be vital indicators because they suggest how much of scarce community resources will be spent on biomedical information.

Who provides this information and how? Our recommendation is to start with community health workers and their counterparts in the affiliated NNLM. These individuals likely will provide qualitative

information, giving considerable detail on local biomedical information use and problems in its transfer from the NNLM. More systematic techniques - focus groups, interviews of community leaders and sample surveys - provide a wider intake of community information. Unfortunately, these methods are costly in time, labor and cash. But they are inexpensive in contrast to years of wasted effort spent in poorly designed information transfer programs.

### General Conceptual and Implementation Issues

Several critiques reviewed discussed the importance of theory in contrast to an exclusive focus on descriptive needs in designing evaluation programs. Most of the models shown above used variously elements of social learning, marketing, diffusion and change, uses and gratifications, and homeostatic theories. This theory basis provided a generality to research findings extending beyond the peculiar circumstances a study described. It allowed each study to contribute to a cumulative body of knowledge. However, there are unmet needs that should be considered in future evaluation research.

- ∞ *Lasting Effects, Infrastructure Development and Sustained Support*: One hope of theory-based projects is that if the theory used is correct, the projects will live on in the minds of participants and in community institutions. Sustainable development must be considered after the attention and intervention of well-funded outsiders is removed. *Discontinuance* is a persistent threat in diffusion projects. The issue remains of devising implementations that train for indigenous self-management of project activity once the outsiders leave. This may not be possible without some form of continuing expert advice and financial aid.
- ∞ *Unintended Consequences*: Change in health information and practices cannot be isolated from a community's dominant culture and way-of-life. If traditional diets are to be changed to less fatty food, much is done to the infrastructure providing these traditional favorites. If folk remedies are supplanted by manufactured pharmaceuticals from outside, then something of local culture and perhaps the herbalist's income are lost. Social status and roles in health information may shift from a revered village grandmother to outside health professionals. Some of these changes may be beneficial for the biologic health of the community, but may be detrimental to its cultural, spiritual and economic well being.
- ∞ *Participatory Action and Community Involvement*: Many of the studies we reviewed carefully courted community participation. Labor savings (through volunteers and local supervision), linking of influential community leaders to project goals, adapting programs to local idioms and customs of community caused interventions to transform from an outside to a local program. Sustainability of the programs became more assured through this localization.
- ∞ *New Media Issues*: The recent growth of computer-mediated communication via email, the internet Web, teleconferencing and telemedicine consultation, and on-line medical libraries (e.g. *Grateful Med* and *Lonesome Doc*), provide new kinds of intervention and new set of characteristics. Particularly for rural venues, cost and inconvenience of current medical information seeking is reduced, diagnostic help may be just a high-band circuit away. But issues of training, cost and access complicate the introduction of internet access to rural and financially challenged communities. The perceptions held by technologically unsophisticated rural residents toward on-line information and computer use is not well understood. Put another way, bringing in new media to rural and disadvantaged communities is the starting point, not the final act of this class of technological intervention. Training, access, community awareness and appropriate use of the innovation remain challenges.

- ∞ *Community Health Paraprofessionals*: Most of the process models shown do not specifically separate out community health agents. Their importance, however, is attested to in many project descriptions. Diffusion research reviews make extensive mention of opinion leaders, change agents and community cadres. The community health workers of rural China (e.g. "barefoot doctors") are frequently given as ideals of culturally and linguistically integrated change agents. In the US, however, we see little mention in communication and health literature of community nurse-practitioners, school nurses and other medical paraprofessionals. There is attention in the literature to the rural physician for whom much has been attempted informationally. But there is a seeming gap in research attention to the paraprofessionals who are increasingly called to the front lines of rural health care.
  
- ∞ *Communication as an Outcome*: Traditionally, communication has been seen in its traditional role as a stimulus; the carrier of innovation, techniques and health information. In short, it is usually positioned as a causal force; an *input* or independent variable. But programs in community development meet a major problem in getting participants to communicate. The simple point here is that communication - largely interpersonal in this context - may deserve better attention as a project *impact*. Do residents discuss and offer social support on health issues? Is the quality of information informally exchanged current and useful? Is there a sustainable diffusion of health information through information community networks? Few studies reviewed, save those with strong indigenous components, considered communication as a major *impact* or *outcome*.
  
- ∞ *Paradox of New Technology and Rural Resources*: The attention of the studies we have reviewed has largely been for Middle America, the modal cities that provide findings useful to mainstream US society. The rural and minority communities have received somewhat less; not only in research attention but in information technologies and health facilities as well. Rural health institutions are increasingly pressed to link informationally to centers of expertise for their very survival. Yet funding for rural telecommunications infrastructure and for training knowledgeable users is in short supply.

## **Notes**

<sup>1</sup> J. Dewey. *The Public and Its Problems*, (Chicago: Gateway Books, 1946).

<sup>2</sup> E. Katz. "On Parenting a Paradigm: Gabriel Tarde's Agenda for Opinion and Communication Research," *International Journal for Opinion*, 1991.

<sup>3</sup> G. Hillary. "Definitions of Community: Areas of Agreement," *Rural Sociology*, 20: 111-123 (1955).

<sup>4</sup> N. Bracht, [ed.] *Health Promotion at the Community Level* (Newbury Park, CA: Sage, 1990), 47.

<sup>5</sup> C. Bell and H. Newby, *An Introduction to the Sociology of the Local Community* (New York: Praeger, 1971), 32.

<sup>6</sup> H. Rhinegold. *Virtual Community: Homesteading on the Electronic Frontier*, (Reading, MA: Addison-Wesley, 1993).

<sup>7</sup> US Congress, Office of Technology Assessment. *The Impact of Health Reform on Rural Areas*, (Washington, DC: USGPO, 1996), 1.

<sup>8</sup> *Ibid.*

<sup>9</sup> US Congress, Office of Technology Assessment. *Health Care in Rural America*, (Washington, DC: USGPO, 1990), 11

<sup>10</sup> US Congress, National Technology and Information Administration. *Falling Through the Net: A Survey of the "Have Nots" in Rural and Urban America*. (Washington, DC: USGPO. July, 1995) 1-7.

<sup>11</sup> *Ibid.*

<sup>12</sup> US Congress, Office of Technology Assessment. *Telecommunications Technology and Native Americans: Opportunities and Challenges*. (Washington, DC: USGPO, August, 1995), p. 2.

<sup>13</sup> The National Rural Health Assn., Internet resource, URL <http://www.nrharural.org/> (10/11/97) and *Rural Health Futures: Integrated Rural Health Information Networks*, Internet resource, URL <http://www.pageplus.com/~ruralfut/doc5.htm> (9/26/97).

<sup>14</sup> US Congress, Office of Technology Assessment. "Bringing Healthcare Online: The Role of Information Technologies" OTA-ITC-624 (Washington, DC: USGPO, September 1995), 96ff.

<sup>15</sup> *Ibid.* 97.

<sup>16</sup> *Ibid.* 127.

<sup>17</sup> M. Field (ed.) *Telemedicine: A Guide to Assessing Telecommunications in Health Care*, (Washington, DC: National Academy Press, 1996)

<sup>18</sup> D. Breckon, J. Harvey and B. Lancaster. *Community Health Education: Settings, Roles and Skills for the 21<sup>st</sup> Century* [3<sup>rd</sup> Ed.] (Gathersburg, MD: Aspen Publications, 1994)

<sup>19</sup> E. Rogers. *Diffusion of Innovations*, (New York: the Free Press, 1995).

<sup>20</sup> S. Fine. *The Marketing of Ideas and Social Issues* (New York: Praeger, 1981).

<sup>21</sup> E. Rogers and D. L. Kincaid. *Communication Networks: Toward a New Paradigm for Research* (New York: Free Press, 1981), 79-142.

<sup>22</sup> B. Dervin and B. Greenberg. "The Communication Environment of the Urban Poor." In G. Kline and P. Titchenor *Current Perspectives in Mass Communication Research*, (Beverly Hills, CA: Sage, 1972), 210-233.

<sup>23</sup> K. Stamm and J. Bowes. *The Mass Communication Process: A Behavioral and Social Perspective*, (Dubuque, IA: Kendall-Hunt, 1990), 227.

- <sup>24</sup> C. Shannon and C. Weaver. *The Mathematical Theory of Communication*, (Urbana, IL: U of Illinois Press, 1949).
- <sup>25</sup> D. Berlo. *The Process of Communication*, (New York: Holt) 1960.
- <sup>26</sup> J. Klapper. *The Effects of Mass Communication*, (New York: Free Press, 1960).
- <sup>27</sup> B. Westley and M. McLean. "A Conceptual Model for Communication Research," *Audio-Visual Communication Review*, 3: 3-12.
- <sup>28</sup> J. Robinson. "Interpersonal Influence in Election Campaigns," *Public Opinion Quarterly*, (Fall, 1976).
- <sup>29</sup> *Op Cit.* Rogers (1995), 163.
- <sup>30</sup> *Ibid.* 299.
- <sup>31</sup> W. Gantz. "Seat Belt Campaigns and Buckling-up: Do the Media Make a Difference?" *Health Communication*, 2(1): 1-12.
- <sup>32</sup> K.Hein, *et al.* "Adolescents and HIV: Two Decades of Denial," in S. Ratzan (ed.) *AIDS: Effective Health Communication for the 90s*, (Washington, DC: Taylor & Francis, 1993), 215-232.
- <sup>33</sup> B. Hennessy. "Public Opinion" [4<sup>th</sup> ed.], (Monterray, CA: Brooks/Cole Publishing, 1981) 21.
- <sup>34</sup> *Op Cit.* Rogers (1995) 45.
- <sup>35</sup> S. Chaffee, J. McLeod and J. Guerrero. "Origins and Implications of the Coorientational Approach in Communication Research" Paper presented to the Association for Education in Journalism Convention, Berkeley, 1969.
- <sup>36</sup> S. Chaffee and J. McLeod, "Sensitization in Panel Design: A Coorientational Experiment" *Journalism Quarterly*, 45: 661-669.
- <sup>37</sup> K. Stamm and J. Bowes . "Communication During an Environmental Decision," *Journal of Environmental Education*, 3: 49-56.
- <sup>38</sup> J. Grunig. "Publics, Audiences and Market Segments: Segmentation Principles for Campaigns," in C. Salmon (ed.) *Information Campaigns: Balancing Social Values and Social Change*, (Belmont, CA: Sage, 1989), 207.
- <sup>39</sup> *Op Cit.* Stamm and Bowes, 142-143.
- <sup>40</sup> M. Caserta. "Health Promotion and the Older Population: Expanding our Theoretical Horizons." *Journal of Community Health*. (June, 1995) 20: 283.
- <sup>41</sup> M. Rothman. *Hierarchical Comparison of Structural Equation Models: An Application to Models of Health Behavior*. (Ph.D. Dissertation, College of Education, University of Washington, 1983), 7ff.

- <sup>42</sup>M. Becker. The Health Belief Model and prediction of dietary compliance: a field experiment. *Journal of Health and Social Behavior*. (1977) 18(4): 348-66,.
- <sup>43</sup> N. Janz and M. Becker. "The Health Belief Model: A Decade Later," *Health Education Quarterly*, (1984) 11(1): 1-47.
- <sup>44</sup>A. Bandura. *Social Learning Theory*, (Englewood Cliffs, NJ: Prentice-Hall, 1977).
- <sup>45</sup> J. Rotter. *Social Learning and Clinical Psychology*. (New York: Prentice-Hall, 1954).
- <sup>46</sup> I. Ajzen and M. Fishbein. *Understanding Attitudes and Predicting Social Behavior*, (Englewood Cliffs, NJ: Prentice-Hall, 1980).
- <sup>47</sup> D. Foote, *et al.*, The Mass Media and Health practices Evaluation in Honduras: A Report of the Major Findings, A report by Stanford University and Applied Communication Technology to the US Agency for International Development (USAID), June, 1985, p. 7.
- <sup>48</sup> D. Breckon, J. Harvey and B. Lancaster. *Community Health Education: Settings, Roles, and Skills for the 21<sup>st</sup> Century* (Gathersburg, MD: Aspen Publishers, 1994), 123.
- <sup>49</sup> L. Green and M. Kreurter. "CDC's Planned Approach to Community Health as an Application of PRECEDE and an Inspiration for PROCEED," *Journal of Health Education*, (1992) 40.
- <sup>50</sup> H. Hyman & P. Sheatsley. "Some Reasons Why Information Campaigns Fail," *Public Opinion Quarterly*, (1947) 11: 413-423.
- <sup>51</sup> SRI International. "Exploring the World Wide Web Population's Other Half" Palo Alto, CA, June, 1995 Internet resource on URL: <http://future.sri.com/vals/vals-survey.results.html>.
- <sup>52</sup> *Op Cit.* Rogers (1995), 182.
- <sup>53</sup> T. Shibutani. *Improvised News: A Sociological Study of Rumor*, (Indianapolis: Bobbs-Merrill, 1966).
- <sup>54</sup> J. Bowes *et al.*, "Communication of Technical Information to Lay Audiences," Report of the Communication Research Center, University of Washington, May, 1978.
- <sup>55</sup> *Op Cit.* Rogers, (1995) 212ff.
- <sup>56</sup> K. Tones, S. Tilford and Y. Robinson. *Health Education: Effectiveness and Efficiency*, (London: Chapman & Hall, 1990).
- <sup>57</sup> J. Farquahar, *et al.* "Community Education for Cardiovascular Health," *Lancet*, (1977) 1192-1195.
- <sup>58</sup> J. Farquahar, N. Maccoby and D. Solomon, "Community Applications of Behavioral Medicine," in E. Gentry (ed.) *Handbook of Behavioral Medicine*, (New York: Guilford, 1984), 437-478.

<sup>59</sup>J. Flora, N. Maccoby and J. Farquahar. "Communication Campaigns to Prevent Heart Disease: The Stanford Community Studies," in R. Rice and C. Atkin (eds.) *Public Communication Campaigns* [2<sup>nd</sup> edition], (Thousand Oaks, CA: Sage Publications, 1989), 240.

<sup>60</sup>*Ibid.* 251.

<sup>61</sup> R. Carlow, *et al.* "Organization for a Community Cardiovascular Health Program: Experiences from the Minnesota Heart Health Program. *Health Education Quarterly*, 11: 243-252.

<sup>62</sup> J. Elder *et al.* "Organizational and Community Approaches to Community-wide Prevention of Heart Disease: The First Two Years of the Pawtucket Heart Health Program," *Preventive Medicine*, (1986) 15: 107-117.

<sup>63</sup> A. McAlister, *et al.* "Theory and Action for Health Promotion: Illustrations from the North Karelia Project." *American Journal of Public Health*, (1982) 72: 43-55.

<sup>64</sup> *Op. Cit.* Simmons.

<sup>65</sup> American Public Health Assn., Workgroup on Public Health Promotion/Disease Prevention. "Criteria for the Development of Health Promotion and Education Programs," *American Journal of Public Health*, (1987) 77: 89-92.

<sup>66</sup> B. Israel, *et al.* "Evaluation of Health Education programs: Current Assessment and Future Directions," *Health Education Quarterly*, (1995) 22(3): 364-389.

<sup>67</sup> *Ibid.*

<sup>68</sup> *Ibid*