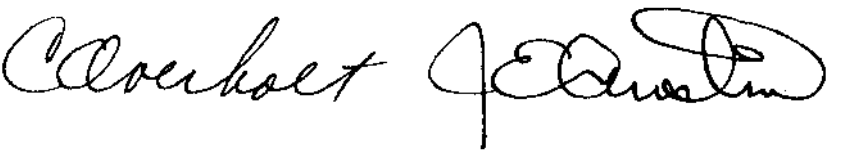

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NUTRITION POLICY: Building the Bridge Between Science and Politics

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CONTENTS

POLICY ROLE OF NUTRITION SCIENCE: HOPES AND REALITIES

One of the major challenges facing nutrition scientists and policymakers is integrating scientific knowledge into the policy formation process. Over three decades ago, in his seminal exploration of the relationship between govern-

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ment and science (40, pp. 28–29), Price pointed to the important policy role of scientists:

> . . . long-range policy decisions do not depend on general political theory, but are frequently made (in effect) by groups of scientists and technicians, working in professional associations or in universities or research institutions, who develop the basic ideas to which the practical politicians will turn in order to deal with the next emergency.
>
> . . . The origins of policies are not to be found in party platforms or the pronouncements of political leaders. They can rather be traced in the discussions that take place among leaders in scientific and professional fields, in the research studies that such discussions stimulate, and in the consequent consensus among the professionals.

Nutrition is a young science, but throughout the twentieth century it has contributed significantly to policy formation. Research has identified nutritional deficiency diseases such as pellagra, goiter, rickets, beri-beri, xerophthalmia, and kwashiorkor and has provided important guidance for nutrition policies such as iodization of salt, vitamin D fortification of milk, vitamin and mineral fortification of cereals, fluoridation of water, vitamin A therapy, and protein-calorie supplementation, as well as protective measures in food safety and quality regulations (12, 15).

That science has contributed importantly to nutrition policies and programs is unquestionable. Yet few concerned scientists or policymakers are satisfied with the links between science and policy or believe that the potential contribution of science is being fully realized. One internationally renowned nutritional scientist with decades of experience interacting with policymakers put it this way[1]:

> It would be nice to establish a neat flow from science to policy decisions, but this is not the case. Decisions are not made on a rational basis.

Another nutrition scientist who has worked in the US government reinforced this view (8, p. 341):

> . . . policy usually ends up being made less by a rational and comprehensive analysis than by an incrementalist approach, which is more attuned to past experience, the inertia of bureaucratic organizations, politics, and legal realities.

Ideally, linking science to policy would involve close coordination and comprehension, open and clear communication, and ready use of scientific findings as a rational basis of national nutrition policy. In reality the process is far from this. The bridge linking science and politics is precarious, and many obstacles impede its strengthening. These obstacles pertain to differences in decision-making criteria and approaches, and barriers to effective communication between scientists and policymakers. We first examine these barriers and then explore possible ways of overcoming them.

[1]Personal communication, May 1987. All personal interview data were collected and presented under agreement to preserve anonymity.

BARRIERS BETWEEN SCIENTISTS AND POLICYMAKERS

Decision-Making Criteria: Nonscientific Factors

In a democracy, nutrition policy is the result of a political process of reconciling multiple interests and objectives. Improved health is but one objective and scientists are but one group of actors. The dictates of scientific evidence are confronted by the often contradictory demands of competing economic, ideological, and bureaucratic interests.

ECONOMIC INTERESTS A nation's food system constitutes a significant part of the total economy, and food expenditures absorb an important share of consumers' incomes. Nutrition policy, by definition, implies changes in the food system. As economic interests are inevitably affected, they will exercise their political voice. The head of one nutrition advocacy group stated it this way: "When scientific research points toward a change in policy, some economic oxen will get gored and so will fight back."[2]

Perhaps the most salient example in recent years has been the food industry's reaction to the National Dietary Goals originally proposed in 1977 by the Senate Select Committee on Nutrition and Human Needs. Whereas balanced consumption from the basic food groups had been the historical emphasis, the Goals stressed eating less of specific foods, such as red meats and eggs. Not surprisingly these producer groups protested (18). This is a generic phenomenon in the politics of nutrition: decades ago when a study by an Iowa State researcher revealed the nutritional equivalency of margarine and butter, dairy interests demanded his dismissal (4, p. 103).

Scientists also have economic stakes in nutrition policy issues. Policies shape the flow of federal grants for nutrition research, which amount to over $200 million annually (24). Also, private industry provides significant grants and consulting fees to scientists. These factors create very real pressures on scientists regarding their choice of research topics and dissemination of their research results. Even if objectivity and integrity remain uninfluenced by these pressures, scientists remain exposed to conflict of interest charges by opponents in the political arena (16, p. 19; 23, p. 15).

Economic considerations in nutrition policy are not restricted to the narrow confines of special interest groups. National concerns about fiscal austerity and alternative uses of scarce financial resources can be of major significance in the policy debate. For example, during the Carter administration (which supported nutrition programs), the Office of Management and Budget recommended that the president veto the 1978 child nutrition legislation because the Women, Infant, and Children (WIC) supplemental feeding program's accelerating budget conflicted with Carter's public commitment to curb infla-

[2]Personal communication, June 1987.

tion through budget reductions (17, pp. 85–137). However, widespread congressional support for WIC, buttressed by both research data suggesting its relative cost-effectiveness as a preventive health measure and a promise by Senator McGovern to reduce its 1980 authorization by $50 million, led Carter to sign the bill.

IDEOLOGICAL INTERESTS Political decision-making involves value judgements. Nutrition policy can be seen as an ideological enemy or ally; some see dietary recommendations by government as an encroachment on the freedom of individual choice (38), and others view nutrition programs as vehicles for income redistribution and social reform. Neither perspective recognizes scientific findings as particularly relevant.

Although expenditures on nutrition programs in the US have expanded dramatically over the past two decades, there have been clear shifts in support of nutrition. During the 1960s, Congressional agriculture committees did not want to have anything to do with nutrition programs except as they helped dispose of farm surpluses. Not until field investigations revealed that many Americans suffered from hunger did the Democratic-controlled Congress turn its attention to nutrition by forming the Senate Select Committee on Human and Nutrition Needs. In 1969 the White House convened the Conference on Food, Nutrition, and Health, chaired by a leading nutrition scientist, and thereby served to "legitimize the concept of hunger as a pressing policy issue and signaled a time for action" (2, p. 9).

Support also shifted as occupants of the White House changed. The surge in nutrition activities at the USDA under the Carter administration was reversed under Reagan; for example, the department's Human Nutrition Research Center was abolished (35). These shifts in part reflected different ideologies regarding welfare, the roles of government and the private sector, and fiscal priorities. Nutrition policy was shaped more by ideology than science.

Besides the values of politicians, scientists' values also intervene in the policy process: ". . . all too often the scientist fails to recognize that he has gone beyond the boundaries of what can be proved by research and is speaking *ex cathedra* on matters on which his own judgment is just as personal, and perhaps nearly as prejudiced, as any layman's" (40, p. 133). One former nutrition policymaker observed that "when scientists become policymakers they become more value-laden and less scientific because they want their agendas achieved."[3]

BUREAUCRATIC INTERESTS Government agencies implementing nutrition policy have their own institutional objectives and interests. They often resist

[3]Personal communication, July 1987.

change or seek to expand their sphere of influence or fight off intruders, irrespective of the scientific merits of the policies involved. For example, the expansion in federal funding for nutrition research in the late 1970s ignited a counterproductive "turf war" between HEW and USDA regarding which was to become the lead agency (5, 49).

Such bureaucratic warfare has plagued nutrition policy in many countries. In Colombia the physicians and nutritionists in one of the major implementing agencies resented the social scientists who directed national nutrition strategy. They even attempted to formulate and operate a separate policy and program, thereby seriously impeding the implementation of the national plan (44).

NONSCIENTIFIC FACTORS AND THE POLICY PROCESS The most prominent message for scientists is that scientific evidence is but one of many inputs into the policy formation process, and by no means necessarily the most significant one. This reality is often not appreciated by scientists and frequently causes them frustration and indignation. Recriminations against politicians as unenlightened champions of special interest groups produce mutual distrust and inhibit effective interaction among politicians and scientists (4). That politicians consider nonscientific criteria reflects their broader set of interests and perspectives that are relevant to policy formation in a democratic process, which is simply a different kind of rationality. Nonscientific considerations should be appreciated as legitimate policy criteria.

A second implication regarding nonscientific factors is that scientific evidence becomes a tool of politics rather than the determinant of policy. Wilson put it succinctly (48, p. 92): ". . . science is used as ammunition, not as a method, and the official's opponents will also use similar ammunition. There will be many shots fired, but few casualties except the truth." Policy formation is an adversarial process, so the sanctity of the scientific method is seldom respected. As Orlans observed (34, p. 2553): ". . . the use of knowledge for policy purposes is always selective, never complete; and the meaning assigned to it by different translators can be contradictory."

The attacks and counterattacks surrounding the evolution of the WIC program illustrate this selective use of data and the scientific method (17). In the original debate for enabling legislation on the Senate floor, opponents cited a study by a Cornell researcher of a pilot program revealing that food supplements targeted to pregnant women and infants were being shared with the entire family. Therefore targeted individuals did not significantly increase their intakes. The proponents, led by Hubert Humphrey, countered by criticizing the pilot study for failing to consider medical effects. Senator Humphrey cited other supplemental programs and used visual aids to display dramatically emaciated infants and underdeveloped brains. The WIC program legislation passed overwhelmingly, but with an amendment requiring an evaluation of its medical effects.

The subsequent evaluations again became tools in the ongoing debate surrounding program expansion. The first medical evaluation by a University of North Carolina (UNC) researcher showed strong gains in growth, hemoglobin concentration, and anemia reduction. The study's methodology was severely criticized by the GAO and by several scientists. A follow-up study by the Center for Disease Control (CDC) found positive growth and health results but strongly qualified its conclusions based on the nonrepresentativeness of the sample data. Another study by the Urban Institute confirmed the findings of the original Cornell study that the WIC supplements were being consumed by all the members of the recipients' families. WIC supporters emphasized the positive results of the UNC and CDC studies, ignoring the methodological criticisms and qualifications. They selected supportive findings from the otherwise negative Cornell and Urban Institute studies, for example, that program participants were anemic and therefore needed attention and that WIC participation increased visits to the health clinics. The proponents prevailed, WIC continued to expand, and a five-year national WIC evaluation was launched. Nonetheless, the political manipulation of research findings continued.

When the results of the national study were submitted to the USDA in the mid 1980s, the officials who received the report were not those who had commissioned it. Unlike their predecessors, they were not favorably disposed toward WIC. The study's findings indicated various positive effects of WIC, but according to the primary investigator for the study, the USDA suppressed dissemination of the study and deleted several parts of the final report that encumbered its reading.[4] The chief scientist felt obliged to report this action to the press and to submit testimony to the Senate.

Examples of the selective use of data also exist in other countries. In Guatemala, scientists proposed the fortification of sugar with vitamin A as a means of addressing a documented widespread problem of hypovitaminosis-A. To their surprise, the proposal was violently criticized by the president of the Association of Chemical Engineers, who stressed the dangers of toxicity and the lack of technological feasibility. These criticisms were scientifically inaccurate but caused considerable debate, aroused unfounded anxieties, and contributed to the initial defeat of the fortification legislation. A countereffort by the scientists using clear technical arguments, and the support of professional societies and local newspapers succeeded in convincing congress to pass the law. It was later discovered that the president of the chemical engineering association "had business and family ties with one of the most powerful sugar manufacturers in Guatemala" (1, p. 82).

Congressional hearings are one of the key forums in which scientific

[4]Personal communication, May 1987.

evidence is used and abused. More often than not the hearings are vehicles for building a predetermined case rather than objectively exploring a policy issue. In a unique study of the role of nutrition scientists in the legislative process, Cross (7) showed how selectivity is used in choosing scientists to testify. One Senate staff member stated the consensus: "The most important criterion was 'did they agree with us.' " Another former Senate staff member commented, "Almost all hearings are staged media events."[5] The other witness-selection criteria included substantive expertise, credibility, reputation (which helped attract press coverage), and ability to communicate.

Committee hearings have multiple scriptwriters. Each committee member can request specific witnesses. After the Senate Select Committee held its initial hearings on the dietary guidelines, economic groups that felt most affected pressured committee members to allow them to testify, so another set of hearings was held (45). These opponents mobilized scientists to present contrary evidence or interpretations. The lobbying pressure of producer groups on committee members from their states was intense and did result in changing some senators' previous positions on the guidelines (16, pp. 35–39).

The 1980 joint publication by USDA-HHS on dietary guidelines encountered similar pressures (11). The American Farm Bureau Federation and other groups requested that President Carter halt distribution of the guidelines because the government lacked "sufficient scientific research basis to promote definite dietary guidelines, particularly as they affect red meats, milk, and egg production" (16, p. 232). These attacks were countered by support for the guidelines from a coalition of consumer groups, labor unions, and scientific societies.

The nature of the nutrition policy issue shapes the relative role that science will play in the process. In general, the more value-laden the issue or the more serious the economic impact of the measures, then the more likely that nonscientific criteria and forces will be the primary determinants of the outcome. Science and scientists become pawns in this political chess game. Some political analysts have suggested that scientific research has relatively little influence at the higher governmental levels of decision-making, where issues are more abstract and deal with values, but has increasing influence at lower levels, where program design issues and government personnel become more specialized, thereby matching the specialized nature of scientific research (17, pp. 60–67; 40, p. 164). This has been the case in some nutrition policies such as the National School Lunch program and the international food aid program, where concerns about agricultural surplus disposal and humanitarian assistance were primary determinants of policy rather than scientific evidence. Science's input came at the operating level where RDAs helped

[5]Personal communication, June 1987.

shape food types and amounts. In other programs such as WIC and the dietary guidelines, this structural paradigm did not hold. Scientific evidence was central to the policy deliberations and decisions. The nature of the issue will greatly determine the role and level of influence of the scientific input.

Decision-Making Approaches: Tolerating Uncertainty

Another impediment to strengthening the bridge between policymakers and scientists is their difference in approach to decision-making. This difference is most apparent in their respective willingness to tolerate uncertainty. Neuberger (32) posed the problem to his colleagues in the British Nutrition Society: "Scientists have not . . . been prepared to give advice unless an almost full consensus of the scientific community was obtained, or unless the evidence on which their advice was based amounted to virtual certainty." In contrast, a former Assistant Secretary for Food and Consumer Services of the USDA stated (9, p. 20), "We in government have to settle a lot of issues on the basis of what's probably right." This contrast is traceable to differences in orientation toward outcomes, evidence, and responsibilities.

OUTCOMES AND EVIDENCE In approaching a policy issue or research question, both politicians and scientists have in mind possible outcomes. Their differences lie in their approaches to addressing possible outcomes. The politician's tendency is to seek out evidence that will be sufficient to support and defend a largely predetermined outcome in the policy arena. The extent of the predetermination will depend on ideological, economic, social, or political factors. In contrast, the scientist seeks vigorously to gather and analyze all relevant data to discover facts or rules about Nature, whatever the result. Rejecting an original hypothesis or revealing a new conclusion is perfectly acceptable or even preferred. For the politician the outcome is the goal; for the scientist the outcome is a result.

Requirements for evidence in decision-making often differ greatly. The rules of evidence for scientists are very clear with specific methodologies and standard indicators, whereas for politicians the rules are vague, variable, and often personalized. The amount of evidence required by the scientist is very high; that needed by the politician is elastic, depending on the nature of the issue and the dictates of the political situation.

The foregoing differences are rooted in the distinct sets of responsibilities that scientists and politicians assume. The policymaker's fundamental task is to make decisions. The perceived obligation to act overrides the desire for more perfect information, as illustrated by the following comments:

Former Canadian Minister of National Health and Welfare (25, p. 57):

> . . . many of Canada's health problems are sufficiently pressing that action has to be taken on them even if all the scientific evidence is not in.

Former USDA Assistant Secretary of Food (9, p. 20):

> . . . human nutrition is not a science that can be left in the laboratories until the final answers are found. People eat every day. Farmers produce, and processors process. We in government are required by law—and, indeed, by common sense—to do what we can to improve the American diet.

Former US federal nutrition program manager:

> Don't give me all those caveats! What's the bottom line?[6]

The "scientist's first responsibility is to the truth, impeccably and meticulously, without compromise, subterfuge, or reservation, the whole truth and nothing but the truth" (34, p. 2555). The imperative of the scientific method is "avoiding hasty generalizations on the basis of meager evidence" and "subjecting hypotheses . . . to critical examination and to experimental tests that have the potential for refuting them" (15, p. 18).

Thus, the scientist's need to respect data and method clash with the politican's need to decide and act. This tension, however, is not only between politican and scientist; it also exists between scientists.

SCIENTIST VS SCIENTIST Clashes between scientists have been quite evident in recent years in the scientific controversy surrounding national dietary guidelines. Dissent and conflict have been intense. These disagreements among scientists appear to stem from differences about what constitutes sufficient evidence and about responsibilities for giving policy advice.

The complex etiology of chronic diseases increases the likelihood of controversy about the role of dietary factors. There is reasonable agreement that the sources of evidence are epidemiological studies, clinical investigations, animal experiments, and in vitro tests; the disagreement is in the relative emphasis on, interpretation of, and reliability of these data sources (37). Epidemiological data appear to be a wedge dividing the scientific community. This is understandable because "even when . . . an epidemiological search has been successfully achieved, it still will not provide absolute proof of a cause and effect relationship" (47, p. 183). Thus, "epidemiology certainly provides fertile ground for controversy" (28, p. 897). Public health oriented scientists tend to rely on epidemiological data to support their conclusion that dietary adjustments such as lowered fat intake would result in a reduction in coronary artery disease. Clinically oriented scientists contend that "the most cogent argument against the adoption of the Dietary Goals in the hope of preventing the chronic degenerative diseases is that the efficacy of this regimen has not been demonstrated in extensive clinical trials" (33, p. 548; see also 13 and

[6]Personal communication, July 1987.

22). These scientists also tend to favor guidelines for specific groups rather than the whole population (42).

Responding to the query "Why do such eminent scientists disagree so fervently on this issue?" one internationally renowned nutrition scientist replied, "We see the world differently . . . I suppose, because I've worked with populations with different diets in Guatemala and Peru and therefore I know you don't have to have coronary heart disease. US diets are simply wrong and clinical trials don't have the range to provide the evidence."[7]

Behind these distinct methodological perspectives lurk important attitudinal differences toward scientists' responsibility as advisors. One camp considers it incumbent on the scientist to render advice even in the face of imperfect information:

> We have a responsibility to pass on to the public our best judgments regarding living healthily. It is necessary to make these judgments while research on the subject still continues. (28, p. 899)

> To simply argue that we are ignorant . . . that we have no advice to offer, is self-defeating and irresponsible. (19, p. 1508)

The basis for decision for this group appears to be this: give advice when there appear to be possible benefits but no harm from proposed dietary changes (18, 20, 21, 31).

The other camp contends that giving advice based on inadequate evidence is dangerous and irresponsible:

> It is a risky practice, fraught with danger, to make policy decisions and develop practical programs on the basis of assumptions that have been projected beyond the knowledge base to support them. (14, p. 42)

> Neither consumers nor nutrition professionals stand to gain from this approach to health problems. It has great potential for undermining both the science of nutrition and nutrition education. It raises false hopes among consumers on inadequate grounds. It is a promise to deliver a panacea that cannot be delivered. (13, p. 319)

It is worth noting that, for many scientists holding this perspective, refraining from giving advice is a professional ethic based on the need for high scientific certainty before guiding others. Personally, however, many have indicated that they have adjusted their own dietary habits based on the existing data. Under this ethic, they feel comfortable assuming personal risks but not in imposing them on others.

To the extent that differences among scientists are due to distinct attitudes toward or definitions of their professional responsibilities, controversy occurs on a value plane rather than a technical one. This, plus the fact that chronic disease issues deal with survival, has made the debates emotionally charged.

[7]Personal communication, May 1987.

As one eminent scientist explained, "Sometimes you get so heated about it you let off steam and become antagonistic."[8] Debate becomes polarized and personalized, often producing much heat but little light.

CONTROVERSY AND CONSENSUS Of concern to our analysis are the implications of controversy and the lack of scientific consensus for nutrition policy formation. There are positive and negative consequences. Disagreement is intrinsic to the scientific method of searching for the "truth" through a process of hypothesis testing and rejecting prior conclusions based on new data. In one sense, science is the antithesis of the democratic process: conclusions are not reached through collective voting but by individual discoveries. Consensus comes through assessments of the merits of discoveries. Scientific knowledge is always changing. When discoveries are in their early stages and the knowledge base thin or novel, controversy is high. When this controversy enters the political arena, it can serve as a useful mechanism of checks and balances, preventing policymakers from being caught up by a specific scientific finding without fully appreciating the risks. Policy controversy can also stimulate more research into areas of disagreement, thereby helping to advance knowledge.

Controversy also carries risks. It can threaten the credibility of science in the eyes of policymakers (14). Politicians look to scientists for answers. When no clear answer emerges, the politician may be scared away from taking any action or may choose to overlook the nutrition policy area. "Unless the nutrition community unites to support a few key actions, political opportunities will be lost" (39, p. 279). Alternatively, politicians may act, but nonscientific factors will determine the outcome (6). Pseudo-nutritionists also tend to move into the vacuum created by uncertainty, and their prescriptions add to the confusion for policymakers and the public. Scientists' influence on policy can thus be neutralized by lack of consensus and may lose its constructive role of narrowing the policymakers' range of uncertainty (46).

Evidently one of the problems we face in trying to develop a better bridge is that scientists keep bumping into each other and this slows progress.

Barriers to Communication

Communicating scientific information has not been an easy task. Deciding how, to whom, and when to communicate poses difficulties.

HOW Strengthening the policy bridge is somewhat akin to visiting a foreign country. Effective communication requires that you learn the foreign lan-

[8]Personal communication, September 1987.

guage. Too often, scientists have remained monolingual and without translators. As Weiss (46, pp. 51–52) put it:

> One of the cognitive problems in getting research findings into the policy sphere is that most communication is written, and the writing of research reports tends to be turgid. Researchers are prone to what others call jargon.
>
> Sophisticated statistics may impede, rather than aid, the policymaker's comprehension of research. Whereas they are a boon to the researcher, providing greater explanatory power, to the policy maker they are a block to intuitive understanding.

One nutrition policymaker lamented, "Scientific language is a problem everywhere. There are usually only a few good ideas and they can all be expressed clearly. The scientists don't need to hide behind jargon, but they bury you in it."[9] One congressman pointed out the problem with a lengthy, technical manuscript he had received from a well-intentioned scientist: "Our time and attention span are very limited. . . . Congress still has many lawyers and very few scientists. A considerable number of us were trained on torts and contracts, not mathematical equations" (29, p. 2568). An international nutrition advisor's observation on experiences in many countries corroborates the generalized nature of this problem (39, p. 278):

> Nutrition scientists shifting to policy advocacy frequently miss the differences in use of information. Condensation, dramatization, and exaggeration transform scientific conclusions into tools for influencing action. Government officials often lack time, interest, or capacity to read and understand nutrition documents and, if they do, lack patience for the reservations and qualifications necessary in presenting scientific findings.

It is not just technical language that hinders communication. By the very nature of their work, scientists may be less exposed to practical realities and fail to recognize the relevance of nonscientific factors or the interest group pressures that surround politicians. They may fail to foresee opposing criticisms and therefore miss the opportunity to formulate and present preemptive counterarguments.[10] There is also the risk of scientific chauvinism that one leading scientist termed "arrogance."[11] Such attitudes can repel rather than attract support (40). Policy formation is a people process where social chemistry counts. There is the further risk of scientists "overselling" their position; it may work once, but unfulfilled promises erode future credibility (10, 26).

TO WHOM The policy arena contains a multitude of actors. It is difficult to identify with whom one should try to communicate. A congressman pointed out the complication: "As public policy issues begin to cycle and recycle through the policymaking process, there are frequently as many congressional perspectives as there are representatives and senators" (6, p. 1185).

[9]Personal communication, July 1987.
[10]Personal communication, September 1987.
[11]Personal communication, September 1987.

Yet Congress is only one of many institutions in the nutrition policy process: others are federal, state, and local executive agencies, the food industry, advocacy groups, professional organizations, and the judiciary. As a further complication to the process, the constellation of actors entering the arena varies depending on the particulars of the nutrition issue being considered. In addition to these groups, the media are important interveners in the communication process, yet most scientists have very little direct experience in dealing with mass media representatives. In short, the "communications map" is complex, variable, and unfamiliar.

WHEN Policymakers and scientists work within different time frames. As one former nutrition policymaker put it, "Three months is a long horizon for a policymaker, whereas two years is a short horizon for a scientist."[12] The window of opportunity for scientists to influence policy is limited. "Policy making is not an event. It is a process that moves through time-consuming stages. . . . During the various stages, policy making does not usually wait for relevant knowledge to become available" (27, p. 7; 43). The policy impact of nutritional status surveys has at times been diluted by long delays in producing results, and political priorities and interest change during that delay (39, 41).

Fear of Involvement

Some nutrition policy observers criticize nutrition scientists for being conspicuous by their absence (3, 7, 10). Many simply choose not to engage in the policymaking process. The multitude of obstacles identified above could certainly give one second thoughts about involvement. However, there may be an even more powerful deterrent. The reward system for most academic scientists is based on research and its published results. Participation in the policy process is not generally a promotion criterion. In fact, it may even be a negative, viewed with disdain by peers as being academically impure (7). Participation also requires time. As one scientist active in the policy arena observed, "It's a tremendous distraction."[13] Even if scientists tiptoe into the policy process, they may not stay very long. One nutrition advocate complained, "The scientists don't stick with it. They want to get on with the next experiment."[14]

Another explanation for noninvolvement may be that scientists are not asked to participate. Links between politicians and scientists are not well developed. Matchmakers are scarce. One scientist playing a central role in nutrition policy formation was brought into the process because a staff

[12]Personal communication, July 1987.

[13]Personal communication, September 1987.

[14]Personal communication, June 1987.

committee member had previously taken one of his courses.[15] In the absence of initiatives from scientists, chance plays its hand. In this process, those excluded may feel resentful and critical of any who participate.

STRENGTHENING THE BRIDGE

Clearly there are a multitude of obstacles strewn about; this final section suggests ways to remove, bypass, or accommodate these obstacles so as to strengthen the link between science and policy.

Be Involved

The last barrier is the first barrier. Scientists must become oriented toward the policy dimension. The narrow focus inherent in specialized scientific investigation should be broadened to consider policy needs and implications. Such an orientation would add a policy dimension to the original formulation of research agendas and questions, thereby increasing the leverage science can subsequently exercise in the policy process. This policy orientation is not incompatible with basic research, which, along with applied research, can make significant contributions to nutrition policy issues.

A policy orientation and motivation for involvement can be significantly strengthened if the scientific community legitimizes involvement in the policy process. Statements by professional organizations emphasizing the importance of and responsibility for contributing to policy improvement would be important. Such contributions can be seen as one form of reciprocating for the taxpayers' support of the scientific community. Similarly, academic institutions incorporating such contributions into criteria for promotion would create incentives. In essence, this implies reflection about the societal role of scientists and their advisory relationship to government. Our perception is that science's contribution to society would be enhanced by more involvement of scientists in the policy process. Abdication of that responsibility adversely affects the quality of nutrition policy.

Understand the Policy Process

It is important to recognize the importance of nonscientific factors to the policy process. Science is but one input; new issues can enter the political arena from many different angles, often quite unexpectedly. These views must be respected and discussed.

One must realize the adversarial nature of the political process. Evidence will be used selectively; the rules of the academy do not apply. Scientists need to be wary of being used and manipulated. They must not be pressured into overselling; more than one scientist's reputation has been smudged by

[15]Personal communication, September 1987.

carelessness due to overzealous advocacy. Retaining objectivity and recognizing counterarguments mitigate such risks.

Scientists need to comprehend and appreciate the policymaker's perspective and situation. Policymakers face the imperatives of compromise and decision. Their tolerance for uncertainty will inevitably be greater than scientists'. The scientist's task is to give a reasoned judgement on the level of uncertainty. By laying out costs, benefits, and probability estimates, scientists can provide useful data upon which policymakers can make more reasoned decisions. Differences in risk preference should not preclude or cloud probability estimates. Scientists can help politicians assess the health implications of various policy alternatives that emerge in political bargaining. Nonscientific factors may prevail in the policy outcome, but the scientific analysis can help make trade-offs explicit. In this approach scientific evidence gets due consideration rather than losing by default.

To equip scientists with a better understanding of the policy formation process requires adjustments in our educational curricula. All science students should take courses on science policy and political processes. Early exposure shapes orientation, affects motivation, and can provide skills. Students of policy and future lawmakers have a similar need for training. Joint courses for both science and nonscience students would contribute significantly to creating mutual comprehension, which would strengthen the basic foundation of the policy bridge of the future.

Make Controversy Constructive

Controversy is as inescapable in scientific discovery as compromise is in politics. Politicians love to have scientific consensus, but this is not always possible. In fact, as the focus of nutrition policy and research shifts from essential nutrient requirements to links between diet and chronic disease, clear consensus will be increasingly unlikely because chronic diseases have complex etiologies. Research methodologies in these areas are less powerful and findings less conclusive. Consequently, the challenge is how to make inevitable controversies contribute to rather than obstruct the policy process.

It is important to help policymakers understand and accept the legitimacy and utility of scientific debate. Usefulness can be enhanced by clarifying the basis of disagreement. This implies distinguishing between technical differences (e.g. about the type, quantity, or interpretation of scientific evidence) and value differences (e.g. different perceptions of advice-giving responsibility in the face of imperfect information). Personalizing, emotionalizing, and polarizing the debate are counterproductive; they confound rather than clarify the issues for the policymaker. If policymakers can understand why scientists disagree, they are less likely to discard the scientific input and more able to ascertain whether to act and under what conditions

of uncertainty. Controversy can elucidate the process, if conducted constructively.

Just as it is useful to pinpoint where and why disagreement exists, it is critical to identify the areas of agreement. Even in the controversial diet and disease debate many analysts found a reasonably wide consensus on many aspects, which provided a comfortable base upon which to make recommendations (8, 30, 31, 36, 37). Policy progress on one set of issues is, thus, not held back by disagreement about others. One might then focus attention on what research is required to resolve remaining areas of disagreement. Chances for greater consensus in the future might also be enhanced by integrating into the training of different types of nutrition scientists greater exposure to each other's primary research methodologies and to public health issues and their relationships to those methodologies. The search for comprehension and collaboration must start in the classroom.

In the political arena, organizations generally carry more weight than individuals. Consensus positions expressed by science institutions are more credible than those of single scientists. The findings and recommendations of the NAS and NRC have often been influential in the policy process. However, they are not immune to political or economic interests; self-policing is needed to safeguard their objectivity, which is the source of their credibility. Professional organizations and the national institutes of health are other important forums.

The goal of creating a united institutional voice for the nutritional sciences has been elusive. The National Nutrition Consortium was one such attempt in the 1970s. Although it promulgated a proposed national nutrition policy and had some effect on the policy process, it found consensus on policy issues extremely difficult because of its member institutions' diversity of professional perspectives. Rather than seeking a single voice, it may be more productive for organizations to develop temporary alliances issue by issue. This more selective approach would allow them to maximize congruency of interests and to achieve a more manageable decision-making process.

Communicate Effectively

To communicate effectively scientists must first clearly identify the audience. In the nutrition policy process there are many participants. Their presence and relevance will vary depending on the issue. One should segment the audience and tailor the message's form and content to the audience. This requires identifying the particular interests of the policy participants. One must understand how scientific information can best assist that participant's role in the policy process. For the nonscientists the language should be nontechnical; brevity may be essential. Technical back-up documentation can be made available to sustain the scientific basis, but should not clog policy communication channels.

To be useful, scientific input must reach policymakers in a timely fashion. Evidence will not always be ready when the policymakers want it; politicians have to recognize the time demands of the research process and increase their patience. Nevertheless, scientists can help by providing interim assessments that allow policymakers to judge the state of knowledge. Much research can be tailored to specific policy issues and designed with a methodology that permits a timetable consistent with the policy process. Scientists' role is often not one of providing evidence but of helping policymakers understand a science issue, frame appropriate questions, or identify possible implications. This extremely valuable input can be enhanced by scientists getting to know actors in the policy arena and being responsive to their inquiries as they arise. This informal consultative network and process may be even more significant than more formal inputs such as testimony at hearings or special scientific reports.

In the policy arena understanding the media is important. If you do not manage the media, they may manage you. In a mass media society, the policy process can be dramatically affected through the media. The 1968 CBS documentary "Hunger in America" was instrumental in raising public and political awareness of US nutritional problems and in triggering a series of actions in Congress and by the Executive that led to major policy decisions. The media's use of information is greatly constrained by space and time restrictions, so previous comments about tailoring and concision are especially pertinent. Careful assessments should be made about when heightened visibility via the media would help or hinder the policy process.

Scientists need not, and often should not, carry out the communication process alone. Sometimes intermediaries should be used. Advocacy groups, agency officials, and congressional staff can often serve as translators, guides, and messengers in the policy arena. The scientist need not cross the bridge alone.

Be Persistent

The policy process is messy, unpredictable, painfully slow, or shockingly fast. Compromise can produce results that deviate from the path dictated by scientific evidence. It is easy to become frustrated. Scientists doing research must have great patience and perseverance. Ambiguous or negative results may lead to new hypotheses and then to new experiments. The search goes on. This same admirable trait of perseverance needs to be applied to involvement in the policy arena. Nutrition policy formation is an iterative process; the political window of opportunity opens, closes, and reopens. Time is on the side of science, because research produces new evidence, resolves old controversies, and forces open the policy window. It cannot be ignored, unless scientists fail to carry their findings forth. Perseverance in the policy arena requires personal fortitude; one must be willing to risk criticism and

even abuse. Politics produces mud-slinging. A strong sense of professional responsibility and confidence are needed to endure. The satisfaction of contributing to society's improvement is the sustenance.

THE CHANGE MAKERS

What characterizes those scientists who have exercised major influence on the nutrition policy process? We posed this question to several policymakers, advocates, and scientists. Cross has also investigated this question (7). The composite profile that emerges reveals scientists with the following attributes:

1. **Vision:** takes a longer view that envisions a distinct state of affairs; can identify priority questions in the policy process.
2. **Breadth:** can see beyond the scientific dimension; can specify policy implications of scientific evidence.
3. **Credibility:** has proven technical expertise that is widely recognized by peers; can mobilize other indivduals and groups.
4. **Political Sensitivity:** comprehends the competing demands of the political process; can spot and capitalize on political opportunities.
5. **Accessibility:** is readily available to policy actors; is responsive to their needs and constraints.
6. **Commitment:** contributes great effort to the policy process as an integral part of their professional mission; is willing to take professional and personal risks.

These characteristics merit emulation, but the most visible scientists are not the only change makers. There are many nutrition policy arenas at the federal, state, and local levels. Nutrition policies and programs are both private and public; opportunities for involvement are all around us. Innumerable scientists participate in a variety of ways in these many different settings. The policy arena is not just for gurus.

As we hurtle toward the twenty-first century, the world faces problems of undernutrition and overnutrition, of dietary deficiencies and chronic diseases. Governments and individuals continue to struggle forward in search of better nutrition and health. Scientists have much to contribute to that search. The policy bridge can be strengthened, and it must be strengthened if science is to realize its full contribution to society.

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