
Chapter 2

# PLANNING MODELS IN HEALTH EDUCATION AND HEALTH PROMOTION

## KEY CONCEPTS

- assessment protocol for excellence in public health (APEXPH)
- behavior change wheel (BCW) model
- CDCynergy
- comprehensive health education model (CHEM)
- intervention mapping model
- model
- model for health education planning (MHEP)
- model for health education planning and resource development (MHEPRD)
- multilevel approach to community health (MATCH)
- PEN-3 model
- planned approach to community health (PATCH)
- PRECEDE-PROCEED model
- social-ecological models

## AFTER READING THIS CHAPTER YOU SHOULD BE ABLE TO

- Differentiate between a theory and a model.
- Apply the PRECEDE-PROCEED model of planning in health education and health promotion.
- Identify the main components of the planned approach to community health (PATCH) model.
- Describe the multilevel approach to community health (MATCH) model.
- Narrate the steps and processes in the intervention mapping model.
- Explain the assessment protocol for excellence in public health (APEXPH) model.
- Outline the comprehensive health education model (CHEM).
- Describe the model for health education planning (MHEP).

- Elaborate on the model for health education planning and resource development (MHEPRD).
- Explain the PEN-3 model.
- Summarize the CDCynergy model.
- Explain the behavior change wheel (BCW) model.
- Explain the social-ecological model.

## DIFFERENCES BETWEEN A MODEL AND A THEORY

A theory helps health education and health promotion programs identify program objectives, specify methods for facilitating behavior change, provide guidance about the timing of the methods, and select the methods of intervention. These are all very specific functions in the broad area of planning. Planning skills are one of the seven essential responsibilities of health educators. In addition to setting objectives and selecting methods, planning functions may include assessing needs, prioritizing needs, allocating resources, matching human resources to tasks, and so on. To achieve these goals, health promotion and health education planning relies on various models.

A **model** can be characterized as a theory in its early stages. Models are eclectic, creative, simplified, miniaturized applications of concepts for addressing problems. Model makers present their ideas but they may not yet have the empirical evidence gained through testing and experimentation that are required of a theory. Sometimes a model is thoroughly tested but the word *model* sticks as part of its name. Unlike theories, models do not provide guidance for micro-level management. An example of a model is the PRECEDE-PROCEED model (Green & Kreuter, 2005), which is used in planning health promotion and health education programs. This model provides guidance for planning at the macro level: what behaviors to target, what resources to tap, how to mobilize the community, and so on. A theory such as social cognitive theory provides guidance at the micro level; it tells which attitudes to change for making the behavior change, what activities to do with the target audience, what educational methods to employ, and so forth. **Table 2-1** summarizes the differences between a model and a theory.

**Planning is bringing the future into the present so that you can do something about it now.**

—Alan Lakein

**Table 2-1 Model Versus Theory**

| Theory | Model |
|---|---|
| Explains or predicts phenomena | Simplified, miniaturized application of concepts for addressing problems |
| Micro-level guidance | Macro-level guidance |
| Empirically tested | Not enough empirical evidence |
| Based in previous literature | Creative |
| Usually parsimonious | Usually tries to cover a lot |
| Does not contain any model | May embody one or more theories |
| Example: Social cognitive theory | Example: PRECEDE-PROCEED model |

**Table 2-2 Planning Responsibility Competencies Identified by HESPA II 2020 for Health Education Specialists**

| | |
|---|---|
| 2.1 | Engage priority populations, partners, and stakeholders for participation in the planning process. |
| 2.2 | Define desired outcomes. |
| 2.3 | Determine health education and promotion interventions. |
| 2.4 | Develop plans and materials for implementation and evaluations. |

**Source:** National Commission for Health Education Credentialing. (2020). Areas of responsibilities, competencies, and subcompetencies for Health Education Specialist Practice Analysis II 2020 (HESPA II 2020). Retrieved from https://assets.speakcdn.com/assets/2251/hespa_competencies_and_sub-competencies_052020.pdf

The Health Education Specialist Practice Analysis (HESPA II 2020) identified essential planning responsibility competencies for health education specialists (National Commission for Health Education Credentialing, 2019). These competencies are summarized in **Table 2-2**. To fulfill these competencies at the macro level, planning models are needed; to accomplish these functions at the micro level, theories are needed.

This chapter focuses on models that are used in planning health promotion and health education programs at the macro level. We begin with an overview of the various planning models and the planning process. The models discussed in this chapter are the PRECEDE-PROCEED model (Green & Kreuter, 2005); the planned approach to community health (PATCH) model (U.S. Department of Health and Human Services [USDHHS], 2005); the multilevel approach to community health (MATCH) model (Simons-Morton, Greene, & Gottlieb, 1995); the intervention mapping model (Bartholomew Eldredge et al., 2016); the assessment protocol for excellence in public health (APEXPH) model (National Association of County and City Health Officials, 1991); the comprehensive health education model (CHEM) (Sullivan, 1973); the model for health education planning (MHEP) (Ross & Mico, 1980); the model for health education planning and resource development (MHEPRD) (Bates & Winder, 1984); the PEN-3 model (Airhihenbuwa, 1993); the CDCynergy model (Centers for Disease Control and Prevention [CDC], 2019), the behavior change wheel model (Michie, Atkins, & West, 2014; Michie, Van Stralen, & West, 2011); and the social-ecological models (Sallis & Owen, 2015).

Linnan and colleagues (2005) surveyed instructors at 253 accredited graduate and undergraduate health education programs to gather information about planning and the professional preparation of health educators. Eighty-eight percent of survey respondents used the PRECEDE-PROCEED model in their teaching, and 62% used the PATCH model. The following discussion presents the models in the order of their popularity as identified by these survey respondents. However, note that today, planning models are being used less often and are being replaced by direct operationalization of theories in planning.

## PRECEDE-PROCEED MODEL

One of the most popular models in health education is the **PRECEDE-PROCEED model**, with approximately 1,000 applications of this model being published in the health field as of the early 2000s (Green & Kreuter, 2005). The acronym PRECEDE stands for "predisposing, reinforcing,

and enabling constructs in educational/environmental diagnosis and evaluation." The acronym PROCEED stands for "policy, regulatory, and organizational constructs in educational and environmental development."

The model originated in the 1970s from applications in hypertension trials (Green, Levine, & Deeds, 1975; Green, Levine, Wolle, & Deeds, 1979), cost-benefit evaluations of health education programs (Green, 1974), family planning studies (Green, 1970), and immunization campaigns (Rosenstock, Derryberry, & Carriger, 1959). The model was initially called PRECEDE—"predisposing, reinforcing, and enabling constructs in educational diagnosis and evaluation"—and remained popular under that name throughout the 1980s (Green, Kreuter, Deeds, & Partridge, 1980). In the 1980s, the movement for health promotion grew very strong; in response, the model evolved, and a number of health promotion functions were added. As a result, it came to be known as PRECEDE-PROCEED. In the 1990s, the role of social-environmental approaches was strengthened even further, and the model emphasized the ecological approach. The latest edition of this model was published in 2005 (Green & Kreuter, 2005). For a detailed discussion of this model, see *Health Program Planning: An Educational and Ecological Approach* (Green & Kreuter, 2005). **Figure 2-1** depicts the model.

The eight phases of the PRECEDE-PROCEED model provide guidance in planning a health program. The first phase is *social assessment*. An assessment of community perceptions provides a starting point for identifying quality-of-life concerns, and methods such as asset

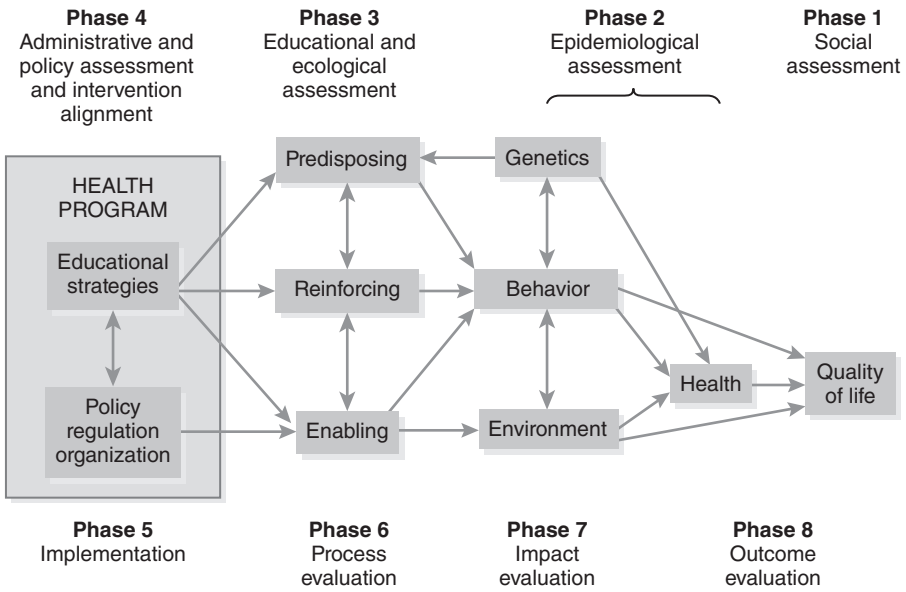



**FIGURE 2-1** Generic representation of the PRECEDE-PROCEED model for health, program planning, and evaluation that shows the main lines of causation from program inputs and determinants of health to outcomes by the direction of the arrows.

Reproduced from Green, L. W., & Kreuter, M. W. (2005). *Health program planning: An educational and ecological approach* (4th ed., p. 10). Boston: McGraw Hill. Reproduced with permission..

mapping, social reconnaissance, nominal group process, the Delphi method, focus groups, central location intercept interviews, and surveys may be employed. Asset mapping is an assessment of the strengths, capacities, and skills of individuals and the existing resources in a community. In social reconnaissance, a point of entry into the community is chosen and local players are identified. Research and briefing materials are prepared, and leaders and representatives are identified. This is followed by field interviews, and then analysis, reporting, and follow-up. In the nominal group process, community participants are recruited and are asked to reflect on a single question. The responses are collected and then ranked in importance by the participants to establish a priority list. In the Delphi method, a panel of experts is recruited and sent a questionnaire. Subsequent mailings of the questionnaire aim at deriving consensus, and the choices are narrowed at each iteration. Focus group discussions are small group discussions on a given topic moderated by a facilitator. Central location intercept interviews are conducted at shopping malls, churches, and other places where target population members can be found. These interviews typically include structured, close-ended questions. Surveys also consist of asking questions of the target population and can be done by mail, email, online, or other means.

The second phase is *epidemiological assessment*, and it includes identifying the specific health problems that are contributing to or interacting with the quality-of-life concerns identified in the social assessment. This phase also identifies the causative factors in the three categories of genetics, behavior, and environment. Epidemiological assessment requires both descriptive and analytical information. In **descriptive epidemiology**, facts regarding the time, place, and population attributes of the health problem are collected through mortality (death), morbidity (illness), and disability rates. **Analytical epidemiology** examines the determinants of health. In this model, analytical work translates into identifying behaviors and environments. Behaviors are of three types: (1) proximal, or direct, actions affecting health; (2) actions influencing the health of others; and (3) distal actions affecting the organizational or policy environment. To diagnose behaviors that need to be targeted, the behavioral factors are rated in terms of importance and changeability. Behavioral objectives are developed for those behaviors that are judged to be more changeable and more important. To diagnose environments, environmental factors are rated in terms of importance and changeability. Environmental objectives also are determined by focusing on the more changeable and more important ones listed.

The third phase is *educational and ecological assessment*. In this phase, factors are classified into the hallmark categories of this model: predisposing, enabling, or reinforcing factors. **Predisposing factors** are antecedents to behavioral change that provide motivation for the behavior (e.g., knowledge, beliefs, attitudes, values, perceptions). **Enabling factors** are antecedents to behavioral or environmental change that allow a motivation or environmental policy to be realized (e.g., availability of resources, accessibility, laws, legislations, skills). **Reinforcing factors** follow a behavior and provide continuing reward for sustaining the behavior (e.g., family, peers, teachers, employers, health providers, community leaders, or decision makers). In this phase, the factors are identified and sorted, priorities are determined, and once again priorities within categories are identified using the criteria of changeability and importance.

The fourth phase is *administrative and policy assessment and intervention alignment*. In this phase, the program components are aligned with priorities, resources needed to run the program are identified, barriers that may influence the program are addressed, and policies needed to run the program are developed. In aligning priority determinants with program components, ecological levels are

first matched with program components, followed by mapping specific interventions, and finally pooling previous interventions to patch any gaps. This phase assesses aspects such as time, personnel, and budget.

The fifth phase is *implementation*. In this phase, several factors may hinder or augment the impact of the program. These factors pertain to the program (e.g., resources and goals), the implementing organization (e.g., employee attributes, organizational goals, and organizational climate), the political milieu, and the environment (e.g., timing and other organizations).

The sixth phase is *process evaluation*. In this phase, the first evaluation is whether the intervention has been implemented in the manner in which it was planned. For example, if 10 activities were planned, have all of them been implemented, and to what extent have they been implemented? Second, the reception of the program at the site where it has been implemented is evaluated. Third, the attitudes of the recipients of the program are considered. How satisfied have they been with the program? What did they like and what did they dislike about the program? Fourth, the response of the person implementing the program is determined. What difficulties did he or she face while implementing the program? What things were easy to do? Finally, the competencies of the personnel involved are assessed. For example, if health education work was done, was it done by a Certified Health Education Specialist (CHES) or someone else?

The seventh phase is *impact evaluation*. Impact evaluation assesses the immediate effect of the program on its target behaviors or environments and their predisposing, enabling, and reinforcing antecedents. For example, a program designed to combat obesity in a community would measure physical activity and consumption of fruits and vegetables.

The final phase is *outcome evaluation*. In this phase, changes in health status (e.g., mortality, morbidity, and disability indicators) and quality-of-life concerns (e.g., perceived quality of life and unemployment) are measured.

The PRECEDE-PROCEED model has been used in a variety of applications in health promotion and health education programming. It has been used to enhance community participation (Lengerich et al., 2007), combat domestic violence (Ekhtiari, Shojaeizadeh, Foroushani, Ghofranipour, & Ahmadis, 2014), plan intergenerational interventions (Garcia et al., 2019), develop health instruments (Bridges et al., 2018; Chang, Brown, Nitzke, & Baumann, 2004), and conduct needs assessments (Castellanos & Abrahamsen, 2014; Hu, Wallace, Jones, & Liu, 2009; Li et al., 2009). The model has also been used in planning disease prevention programs at worksites (Wilkens, 2003) and health programs in school settings (Rezapour, Mostafavi, & Khalkhali, 2016). Additional applications include hypertension (Calano et al., 2019) and weight management programs (Cole & Horacek, 2009, 2010), training of healthcare staff (Larson, Cohn, Meyer, & Boden-Albala, 2009), improving self-care (Chiang, Huang, Yeh, & Lu, 2004), implementing patient education on anticoagulant therapy (Shaha et al., 2015), ensuring compliance behaviors (Kang, Han, Kim, & Kim, 2006), diabetes education programs (Azar, Solhi, Nejhaddadgar, &Amani, 2017; Azar et al, 2018), and suicide prevention program (Bridges et al., 2018). **Table 2–3** summarizes these applications.

**The hallmarks of the PRECEDE-PROCEED model are: (1) flexibility and scalability, (2) evidence-based process and evaluability, (3) its commitment to the principle of participation, and (4) its provision of a process for appropriate adaptation of evidence-based "best practices."**

—Green and Kreuter (2005, p. 18)

The developers of this model, Larry Green and Marshall Kreuter, teamed up with Robert Gold to develop a software program designed

**Table 2-3 Applications of the PRECEDE-PROCEED Model**

| |
|---|
| Enhancing community participation |
| Combatting domestic violence |
| Planning intergenerational interventions |
| Developing health instruments |
| Conducting needs assessments |
| Planning disease prevention programs at worksites |
| Controlling hypertension |
| Planning health programs in school settings |
| Creating weight management programs |
| Training healthcare staff |
| Improving self-care |
| Implementing patient education on anticoagulant therapy |
| Ensuring compliance behaviors |
| Developing diabetes education programs |
| Developing suicide prevention program |

to help health educators in academia who teach community health courses and assist practitioners in the field to plan and implement community health programs. The software is called EMPOWER (Enabling Methods of Planning and Organizing Within Everyone's Reach) (Gold, Green, & Kreuter, 1998). The program provides a specific example in the area of breast cancer prevention and control and walks the user through the various steps of the PRECEDE-PROCEED model.

The PRECEDE-PROCEED model is by far the most popular and most researched model in the field of health promotion and health education. It has been in existence for more than four decades, and professional health educators are familiar with this model. It is very comprehensive and covers all areas of planning. The initiation of the model utilizes community inputs and participation, which is a big plus. The phased evaluation is also a strong feature of the model.

However, the model does have a few limitations. First, it is too comprehensive to be fully implemented in many situations. Health promotion and education funding may be allocated for work in a specific area, with no provision for social assessment or epidemiological assessment. In such cases, the model is implemented in a piecemeal fashion. Second, health promotion and education programs are often implemented on a limited basis. These programs may not account for changes in health outcomes, making comprehensive evaluation impossible. Third, the model is a mixture of several theories, and it is not possible to discern which component of the model is working and to what extent. Finally, comparative studies with other models have not been done; therefore, the relative utility of this model cannot be ascertained.

# PLANNED APPROACH TO COMMUNITY HEALTH MODEL

The **planned approach to community health (PATCH) model** was developed in the mid-1980s by the Centers for Disease Control and Prevention (CDC) in partnership with state and local health departments and several community groups (USDHHS, 2005). It is an effective community health planning model that is used by many states and communities and several countries. The PATCH model aims at increasing the capacity of communities to plan, implement, and evaluate community-based health promotion programs. Thus, capacity building is a very important part of the model. The PATCH model builds on the PRECEDE model (Kreuter, 1992), but is more user-friendly and does not use academic terminology. A key strategy of the PATCH model is that it builds linkages within the community and between the community and the state health department, universities, and other regional and national organizations.

**PATCH was built on the same philosophy as the World Health Organization's Health for All and the Ottawa Charter for Health Promotion, which specifies that health promotion is the process of enabling people to increase control over their health and to improve their health.**

—U.S. Department of Health and Human Services (2005, p. I-H-I)

After its initial development in 1984–1985, a pilot program using the PATCH model was tested in six states by the CDC. Based on the feedback received, it was revised and then delivered in 11 additional states. In 1988, evaluation studies were performed by the University of North Carolina, the Research Triangle Institute, and the PATCH National Working Group. All three studies found the PATCH model to be effective. Since 1991, the CDC has not directly delivered the PATCH program in communities; instead, the CDC provides training and consultation to state health departments. Currently, most state health departments have a state coordinator and staff trained in the PATCH model. **Table 2-4** summarizes the five key elements of the PATCH model.

Active participation of community members is vital in the PATCH model. People participate in analyzing community data, setting priorities, planning intervention activities, and making decisions on the health priorities of their communities. Using qualitative and quantitative data to identify a community's health status and needs is also important in the PATCH model. Community members are engaged in analyzing the factors that contribute to a health problem, in linking with *Healthy People 2030* objectives (U.S. Department of Health and Human Services, 2019), and in designing health promotion interventions. Examples of these interventions are educational programs, mass media campaigns, and policy advocacy. These interventions are conducted in

**Table 2-4 Key Elements of the PATCH Model**

| |
|---|
| Community members participate in the process. |
| Data guides the development of programs. |
| Participants develop a comprehensive health promotion strategy. |
| Evaluation emphasizes feedback and program improvement. |
| Community capacity for health promotion is increased. |

various settings, such as schools, healthcare facilities, community sites, and workplaces. Community members then conduct timely evaluations. Finally, the community becomes empowered and can replicate the process for more than one health condition.

The PATCH model has five distinct phases for planning a health program. The first phase is *mobilizing the community*. In this phase, the target community is defined, participants are actively recruited from the community, partnerships are formed, and a demographic profile of the community is completed. Efforts are made to ensure that the participants who have been recruited are representative of the demographic profile of the community. In this phase, a steering committee is also formed and community leaders are involved.

The second phase is *collecting and organizing data*. In this phase, community members obtain data on mortality, morbidity, community opinion, and behaviors. The quantitative data are collected from sources such as vital statistics and surveys, and the qualitative data are collected from community leaders and others. The data are analyzed and shared with the community.

The third phase is *choosing health priorities*. In this phase, the community group analyzes the social, economic, political, and environmental factors that affect the behaviors that are detrimental for health. As a result of this analysis, they identify priorities and develop objectives.

The fourth phase is *developing a comprehensive intervention plan*. In this phase, the community group identifies resources, assesses existing programs, reviews existing policies, and appraises conditions. Then the group develops intervention objectives and an intervention plan. The intervention plan includes details of strategies, a time line, and an activity plan for activities such as recruiting volunteers, publicizing activities, evaluating activities, and informing the community about results.

The fifth phase is *evaluation*. The purpose is to monitor and assess progress achieved during the phases of PATCH and to evaluate interventions. The unique feature here is that the community determines the end points of evaluation, and feedback is provided to the community.

Goodman, Steckler, Hoover, and Schwartz (1993) studied PATCH projects to see how communities traversed the various stages of PATCH. They found the approach to be effective, but recommended the following changes to enhance the effectiveness of the PATCH model:

1. Conduct a community capacity assessment prior to initiating a community needs assessment.
2. Do not rely solely on behavioral risk factor surveys.
3. Analyze needs assessment data quickly, and share the assessment with the community as soon as possible.
4. Allow for flexibility and modifications by the community when determining the priority of health objectives.
5. Provide technical assistance throughout the project, not just in the beginning.
6. Fund at least one full-time local coordinator, and encourage extensive capacity building.
7. Emphasize multiple interventions around one chronic condition at a time.
8. Emphasize program institutionalization.

Suen, Christenson, Cooper, and Taylor (1995) studied the performance of 2,888 local health departments regarding core public health functions. They categorized the core functions of local health departments as follows: (1) health-related data collection, surveillance, and outcomes monitoring; (2) protection of environment, housing, food, and water; (3) investigation and control of diseases and injuries; (4) public information and education; (5) accountability and quality assurance; (6) laboratory services; (7) training and education; and (8) leadership, policy development,

and administration. They found that the performance index was greater for all eight functions in those local health departments using health planning models such as the PATCH model. PATCH is indeed a very user-friendly model at the local health department level. For more specific details of this model, see the *Planned Approach to Community Health: Guide for the Local Coordinator* (USDHHS, 2005). The PATCH model has not been reported in the literature in recent years and has declined in popularity. This model is presented here mainly for academic purposes.

## MULTILEVEL APPROACH TO COMMUNITY HEALTH MODEL

In the late 1980s, Simons-Morton, Greene, and Gottlieb (1995) introduced the **multilevel approach to community health (MATCH) model**. It is a very practical, yet comprehensive model. It places the health educator at the center of planning and can be implemented without an extensive local needs assessment. Few reports on the use of this model are available other than those by Simons-Morten and colleagues. **Table 2-5** summarizes the five phases in the MATCH model.

The first phase is *goals selection*, and it includes four steps: (1) selecting health status goals by looking at prevalence, perceived and actual importance, changeability, and availability of programmatic resources; (2) selecting the target population by looking at health problem prevalence, accessibility, and programmatic interests; (3) identifying health behavior goals by looking at prevalence, association, and changeability; and (4) identifying environmental goals by looking at access to services, availability of programs and resources, enabling policies, practices, regulations, and barriers.

The second phase is *intervention planning*, which includes four steps: (1) identifying the targets of intervention at the community level, (2) selecting intervention objectives, (3) identifying mediators of the intervention objectives (e.g., knowledge, skills, attitudes, and practices), and (4) selecting intervention approaches by applying theories.

The third phase is *program development*, and it also includes four steps: (1) creating program units or components that include paying attention to the target population, intervention targets, intervention objectives, structural units, and channels; (2) selecting or developing curricula and creating intervention guides that include learning objectives, content, teaching/learning methods, and materials; (3) developing session plans in which educational objectives are delineated with teaching/learning activities, materials, and specific instructions; and (4) creating or acquiring instructional materials in which existing materials are reviewed and selected and new materials developed after pilot testing.

**Table 2-5 Phases of the MATCH Model**

| |
|---|
| Phase 1. Goals selection. |
| Phase 2. Intervention planning. |
| Phase 3. Program development. |
| Phase 4. Implementation preparation. |
| Phase 5. Evaluation. |

The fourth phase is *implementation preparation* and comprises two steps. The first step includes facilitating, adopting, implementing, and maintaining a health behavior by developing a specific proposal; developing the need, readiness, and environmental supports for change; providing evidence of the efficacy of the intervention; identifying change agents and opinion leaders; and establishing constructive working relationships with decision makers. The second step in this phase concerns selecting and training implementers.

The fifth and final phase is *evaluation*. There are three levels of evaluation: (1) process evaluation, which assesses recruitment, session, and program implementation, quality of learning activities, and immediate outcomes; (2) impact evaluation, which examines antecedents of behaviors and environments, changes in behaviors and environments, and any side effects of the program; and (3) outcome evaluation, which assesses health outcomes, cost-effectiveness, and policy recommendations. For more details on this model, see *Introduction to Health Education and Health Promotion* (Simons-Morton et al., 1995). In recent years, the MATCH model has not been reported in the literature, and it has declined in popularity. This model is presented here mainly for academic purposes.

**Whereas PRECEDE-PROCEED emphasizes formal needs assessment, MATCH as formulated by Simons-Morton and associates (1995) is a framework that gives more attention to implementation.**

—Simons-Morton, Greene, and Gottlieb (1995, p. 132)

## INTERVENTION MAPPING

In the 1990s, Bartholomew Eldridge and colleagues (2016) proposed a model for health education and health promotion planning called **intervention mapping**. This social-ecological approach looks at individual behaviors in an environmental context. Intervention mapping has been used for several types of programs in health promotion and education. Examples of such programs are breast and cervical cancer screening (Fernandez, Gonzales, Tortolero-Luna, Partida, & Bartholomew, 2005), diabetes self-management education (Song, Choi, Kim, Seo, & Lee, 2015), diet and physical activity promotion (Chen et al, 2019; van Stralen, de Vries, Mudde, Bolman, & Lechner, 2009), fruit and vegetable promotion (Mérida Rios et al., 2019), prevention of HIV and sexually transmitted diseases (STDs) (Mkumbo et al., 2009), and school-based physical activity injury prevention (Collard, Chinapaw, van Mechelen, & Verhagen, 2009). It has also been applied to supporting healthy lifestyles for leg ulcer patients (Heinen, Bartholomew, Wensing, Kerkhof, & Achterberg, 2006), sexual and reproductive health (Aaro et al., 2014), socioeconomic health inequities (Peplow & Augustine, 2017), recruitment behavior of minorities for participating in clinical trials (Amorrortu et al., 2018), and rehabilitation of cancer patients (McEwen et al., 2015). Additional applications include violence prevention (Kalokhe et al., 2019) and weight gain prevention (Verweij, Proper, Weel, Hulshof, & van Mechelen, 2009). These applications are summarized in **Table 2-6**.

**An intervention at one environmental level can influence causal factors at multiple levels. For example, a program to conduct health-related lobbying may influence a legislative behavior (passing laws) that may influence individual level health behavior.**

—Bartholomew Eldridge, Markham, Ruiter, Fernandez, Kok, and Parcel (2016, p. 9)

The fundamental tenets of intervention mapping are based on the use of evidence-based (theory-based) approaches to program planning, the use of ecological (environmental)

**Table 2-6 Applications of Intervention Mapping**

| |
|---|
| Breast and cervical cancer screening |
| Diabetes self-management education |
| Diet and physical activity promotion |
| Fruit and vegetable promotion |
| HIV and STD prevention |
| School-based physical activity injury prevention |
| Healthy lifestyle promotion in leg ulcer patients |
| Sexual and reproductive health |
| Socioeconomic health inequities |
| Recruitment behavior of minorities for participating in clinical trials |
| Rehabilitation of cancer patients |
| Violence prevention |
| Weight gain prevention |

constructs in program planning, and the active participation of the target population. Intervention mapping is a six-step process:

1. *Establishing a logic model of the problem.* This entails an assessment of the target population's health, quality of life, behavior, and environment, along with an assessment of community capacity. In this step, program outcomes are established, and a participatory planning group is formed that includes the planners, implementers, and participants. The outcome of this step is a graphical representation showing relationships between putative determinants (antecedents) and health outcomes.
2. *Establishing program outcomes, objectives, and a logic model of change.* In this step, performance and change objectives are established and rated in terms of changeability and importance. An example of a behavioral change objective for a nutrition education program might read, "At the end of the program, 90% of the children will quit drinking sugar-sweetened beverages."
3. *Designing the intervention.* In this step, the program is reviewed with interested participants, theoretical methods are identified, program methods are chosen, and design strategies that match change objectives are selected. This step includes five substeps. In the first substep, the planning group generates ideas. In the second substep, the theoretical methods are identified for the change objectives. In the third and fourth substeps, practical methods are chosen. In the final step, each change objective is matched with a theoretical method and a practical method.
4. *Production of the intervention.* In this step, consultation with program participants and implementers is conducted; program scope, sequence, theme, and materials are listed; protocols are designed; and program materials are prepared and pretested with the target audience.
5. *Developing intervention implementation plan.* In this step, adopters and users are identified; adoption, implementation, and sustainability performance objectives are decided; and interventions are designed to affect program use.

6. *Planning for evaluation*. In this step, the program is described, along with program outcomes, effect questions, and process questions. Then indicators and measures are developed, and evaluation designs are specified.

For complete details on this model, see *Planning Health Promotion Programs: An Intervention Mapping Approach* (Bartholomew Eldridge et al., 2016) or the website https://interventionmapping.com.

## ASSESSMENT PROTOCOL FOR EXCELLENCE IN PUBLIC HEALTH MODEL

The **assessment protocol for excellence in public health (APEXPH) model** was developed by the National Association of County and City Health Officials (NACCHO) with funding from the CDC in the late 1980s (NACCHO, 1991). The intended users for this planning model are local health departments. The model helps in building organizational capacity and establishes a leadership role for local health departments. The unique features of this model are as follows:

- It is a self-assessment tool.
- It leads to development of a practical plan of action.
- It focuses on the local health department's capacity and the community's actual and perceived needs.
- It helps the local health department to build its relationships with other local government agencies and community, state, and federal agencies.
- It provides a protocol through which a health department can assess health needs, set priorities, develop policy, and ensure that health needs are met.
- It fits local situations and resources.

The APEXPH model is a three-part process. The first part is an *organizational capacity assessment*. In this part, an internal review of the local health department is performed to determine the administrative capacity of the department, and a plan of action is created. The second part is the *community process*, in which key members of the community are involved to assess the health of the community. A community advisory committee is established to identify and prioritize key health problems. Health data are collected and analyzed, goals and objectives are developed, and local resources are identified. The third part is *completing the cycle*. The organizational action plan and community health plan are monitored and evaluated, and the three core functions of assessment, policy development, and assurance are institutionalized. Applications of this model have been reported on in Kentucky (Kalos, Kent, & Gates, 2005), Illinois (Turnock, Handler, Hall, Lenihan, & Vaughn, 1995), and Michigan (Vaughn, Richards, Christenson, Taylor, & Eyster, 1994). An application of the APEXPH model has also been reported in the postwar stalemate in Nagorno-Karabakh, an ethnically Armenian territory locked within post-Soviet Azerbaijan (Thompson, Dorian, & Harutyunyan, 2010). This model is no longer frequently used and is presented here mainly for academic purposes.

**APEXPH is a voluntary process for organizational and community self-assessment, planned improvements, and continuing evaluation and reassessment.**

—National Association of County and City Health Officials (1991)

## COMPREHENSIVE HEALTH EDUCATION MODEL

One of the earliest planning models was the **comprehensive health education model (CHEM)**, developed in the early 1970s by Sullivan (1973). The chief advantage of this model lies in its simplicity. The model comprises six steps:

1. *Involving people*. The target population and the personnel required to carry out the program are identified, and a working relationship between the two is established.
2. *Setting goals*. Programmatic goals and objectives are established that mirror health education practices and resources in the target population.
3. *Defining problems*. The planners determine the gaps between what is and what ought to be and prioritize problems.
4. *Designing plans*. The most appropriate approach is identified, program objectives are set, a time line is defined, activities and resources are selected, and a pretest is conducted.
5. *Conducting activities*. The program is implemented.
6. *Evaluating results*. The evaluation results are used for continuing or changing the program.

As the planners move through each of these steps, they must consider the interaction of the health problem with the chosen behaviors, reflect on the available best practices, contemplate the limitations of health education, and identify resources needed to conduct the program. The CHEM has not been reported in the literature in recent years, and it is mentioned here mainly for historical reasons.

## MODEL FOR HEALTH EDUCATION PLANNING

Another early model in health education planning, developed in the 1960s, is the **model for health education planning (MHEP)** (Ross & Mico, 1980). This model also is not used much in current practice. The model has six phases, each of which has three dimensions: content (subject matter), method (steps and techniques), and process (interactions):

1. *Program initiation*. Planners develop an understanding of the target population's problem, develop a relationship with the population, and create awareness of the problem.
2. *Needs assessment*. Planners identify past assessment efforts, collect new data, analyze data, and describe the problem.
3. *Goal setting*. Goals are based on the problems identified in the needs assessment. Goals must be appropriate and realistic. In addition, input from those who will be affected is gathered, and strategies are developed for implementing the identified goals.
4. *Planning/programming*. Planners translate the strategies into a rational implementation plan or program, design systems and tools for managing the activities, and arrange for commitments among all the involved parties.
5. *Implementation*. The activities are initiated, training and technical assistance are provided, problem solving is carried out, and reporting is done.
6. *Evaluation*. Evaluation measures are clarified, data are collected and analyzed, and refinements to the program and process are made.

One application of this model has been for continuing education of occupational health nurses (Moore & Short, 1994). Other than that, it has not been applied much in recent years. This model is presented here mainly for academic purposes.

## MODEL FOR HEALTH EDUCATION PLANNING AND RESOURCE DEVELOPMENT

The **model for health education planning and resource development (MHEPRD)** was proposed by Bates and Winder (1984) in the early 1980s, but it is not among the more popular models and is little used in health education practice today. The hallmarks of this model are that it considers planning as a cyclical process, it separates processes from the end products, and it considers evaluation not as a separate step but as an integrated element throughout the model. The model has five phases:

1. *Health education plans*. A health education plan is drafted based on the end result of the needs assessment (which in this model is called a policy analysis process) and is subject to an ongoing evaluation process.
2. *Demonstration programs*. A demonstration program is created through a development process and an ongoing evaluation process.
3. *Operational programs*. The validation process determines which programs should be continued, and thus made operational, and which ones must be dropped. The ongoing evaluation process continues in this phase. This phase also entails development of an implementation plan.
4. *Research programs*. Those programs that are based on sound research continue to be implemented.
5. *Information and statistics*. Data are gathered once again and go through the policy analysis process in phase 1 in order to guide further planning.

In recent years the MHEPRD has not been reported in the literature, and it is mentioned here mainly for historical reasons.

## PEN-3 MODEL

The **PEN-3 model** was developed as a child survival program for African countries (Airhihenbuwa, 1993, 1995). Later its use was extended to several other applications with minority populations, such as breast and cervical cancer screening in Latina women (Erwin, Johnson, Feliciano-Libid, Zamora, & Jandorf, 2005; Erwin et al., 2007; White, Garces, Bandura, McGuire, & Scarinci, 2012), breast self-examination and screening among Iranian women (Moghaddam, Shahnazi, & Hassanzadeh, 2019; Naghibi, Shojaizadeh, Montazeri, & Yazdani Cherati, 2015), cervical cancer screening in African American women (Williams, Moneyham, Kempf, Chamot, & Scarinci, 2015), cancer screening in African American men (Abernethy et al., 2005), breast cancer education for African American women (Kline, 2007), and breast cancer screening promotion in native Hawaiian women (Ka'opua, 2008). It has also been applied to dietary behaviors in African Americans (James, 2004; Kannan, Sparks, Webster, Krishnakumar, & Lumeng, 2010), health factors in Latino immigrants (Garces, Scarinci, & Harrison, 2006), physical activity promotion in Hispanics/Latinos (Perez & Fleury, 2018; McInvale Trejo & Shaw-Ridley, 2019), and smoking practices among African Americans (Beech & Scarinci, 2003). **Table 2–7** summarizes these applications.

| Table 2-7 Applications of the PEN-3 Model |
|---|
| Breast and cervical cancer screening for Latina women |
| Breast self-examination and screening for Iranian women |
| Cervical cancer screening for African American women |
| Cancer screening for African American men |
| Breast cancer education for African American women |
| Breast cancer screening promotion for native Hawaiian women |
| Child survival in African countries |
| Dietary behavior among African Americans |
| Health factors of Latino immigrants |
| Physical activity promotion among Hispanics/Latinos |
| Smoking practices among African Americans |

The model consists of three dimensions, each of which contains the acronym PEN. The model is depicted in **Figure 2-2**. The three dimensions are interrelated and interdependent. The first dimension, cultural identity, has the following PEN:

- P *Person*. Health education should be committed to improving the health of every person.
- E *Extended family*. Health education should be directed toward not just the person's immediate family, but also his or her extended family or kin group.
- N *Neighborhood*. Health education should be directed toward improving health in neighborhoods and communities. Involvement of community leaders is vital for culturally appropriate health programming.

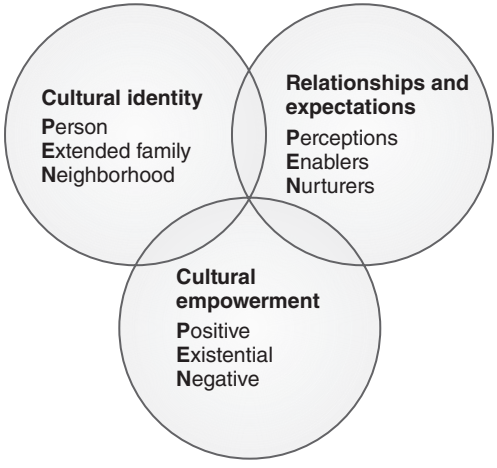



**FIGURE 2-2** The PEN-3 model.

The second dimension of the PEN-3 model used to be called the "educational diagnosis of health behavior," but it is now referred to as "relationships and expectations" (Webster & Airhihenbuwa, 2005). This dimension evolved from the health belief model (Hochbaum, 1958), the theory of reasoned action (Fishbein & Ajzen, 1975), and the PRECEDE-PROCEED model (Green & Kreuter, 2005). In this dimension the PEN acronym is as follows:

- P *Perceptions*. These are the knowledge, beliefs, attitudes, and values that may facilitate or hinder motivation for changing a given behavior. Health programs must start with the person's perceived perceptions, rather than the real needs identified by the planners.
- E *Enablers*. These are societal or systemic forces that may augment the health behavior or hinder it by creating barriers. These include available resources, accessibility, referrals, and types of service.
- N *Nurturers*. These are reinforcing factors that an individual may receive from significant others. These significant others could be members of the extended family, peers, employers, health personnel, religious leaders, or government officials.

The third dimension of the PEN-3 model used to be called the "cultural appropriateness of health beliefs," but is now referred to as "cultural empowerment" (Webster & Airhihenbuwa, 2005). Thus, this model is particularly useful for work with minority populations and yields a culturally appropriate program. The PEN acronym in this dimension is as follows:

- P *Positive*. These are the positive perceptions, enablers, and nurturers that help the person, family, or community to engage in positive health practices. These positive health practices lead to empowerment at the individual, family, and community levels.
- E *Existential*. These consist of practices that are neither good nor bad, and thus do not need to be changed.
- N *Negative*. These are the negative perceptions, enablers, and nurturers that help the person, family, or community to engage in negative practices that impair health.

This model goes through several phases as part of the planning process. In the first phase, health education, the planners decide whether the health education effort is directed toward individuals, extended families, or communities. In the second phase, the planners collect data by surveys or interviews, and identify the beliefs and practices related to perceptions, enablers, and nurturers. The third phase entails classifying these beliefs into three categories: positive, existential, or negative. In the final phase, the planners classify beliefs into those that are rooted in cultural patterns and those that are newly formed and select culturally appropriate health education strategies. For further reading on 45 applications of this model please refer to a published systematic review (Iwelunmor, Newsome, & Airhihenbuwa, 2014).

## CDCYNERGY

**CDCynergy**, created in the 1990s by the CDC, was a multimedia CD-ROM used for planning, managing, and evaluating public health communication programs (CDC, 2019). It originated as a planning model for communication programs but was expanded and tailored for a variety of public health planning applications.

CDCynergy is a six-phase process:

1. *Problem definition and description*. The problem is defined, and resources are considered.
2. *Problem analysis*. Goals are set.
3. *Communication program planning*. The primary and secondary target audiences are chosen, and communication objectives are set.
4. *Program and evaluation development*.
5. *Program implementation and management*.
6. *Feedback*. Feedback is given and used to refine the program.

A "lighter" version of CDCynergy for social marketing applications, called CDCynergy Lite, is also available (CDC, 2010). The tool takes the practitioner step by step through the process, giving instructions on "What It Is" and "How It Is Done," with tools and templates for each step.

The first step in CDCynergy Lite is *problem description*. In this step, the user writes a problem statement, lists and maps the causes of the health problem, identifies potential audiences, and conducts a SWOT (strengths, weaknesses, opportunities, and threats) analysis that assesses the factors in the broader situation that could have an impact on the implementation of the program or its ultimate success.

The second step is *market research* (also called *consumer or audience research*), which is designed to enhance the understanding of the target audience's characteristics, attitudes, beliefs, values, behaviors, determinants, benefits, and barriers to behavior change in order to create a strategy for social marketing programs. This entails defining the research questions, developing a market research plan, conducting and analyzing market research, and summarizing the research results.

The third step is developing a *market strategy*, which is a plan of action for the entire social marketing program. It entails selecting the primary and secondary target audience segments, defining current and desired behaviors for each audience segment, prioritizing audience/behavior pairs, and describing the benefits the program will offer.

The fourth step is *interventions*, where the user identifies the methods that will be used to promote behavior change (e.g., developing a website to promote physical activity in youth). This entails selecting members and assigning roles for the planning team; writing specific, measurable objectives for each intervention activity; and writing a program plan, including time line and budget, for each intervention.

The fifth step in CDCynergy Lite is *evaluation*. In this step, the user identifies the program elements that will be monitored, selects key evaluation questions, determines data collection methods, formulates a data analysis plan, and outlines a time line and budget.

The final step is *implementation*. During this step, the user prepares for program implementation, producing the program materials, hiring and training the staff, and launching the program.

The guide to plan a program using CDCynergy Lite is available at https://www.cdc.gov/healthcommunication/CDCynergyLite.html.

## BEHAVIOR CHANGE WHEEL (BCW) MODEL

The **behavior change wheel (BCW) model** is a planning model that was developed in the United Kingdom (Michie et al., 2011, 2014). The BCW model is a cyclical, rather than linear, model. It has three wheels of planning. The inner wheel pertains to planning with regard to the *sources of behavior*: capability, opportunity, and motivation influenced by physical,

**Table 2-8 Applications of the BCW Model**

| |
|---|
| Improving hearing-aid use |
| Improving medication adherence |
| Promoting physical activity |
| Reducing sitting time in the workplace |
| Smoking cessation |
| Stroke patient rehabilitation |
| Weight loss programs |

psychological, and social factors. The planner delineates the behavior and its antecedents in this wheel. The middle wheel consists of *intervention functions*, such as education, persuasion, incentives, coercion, training, enabling, modeling, environmental restructuring, and restrictions. In this wheel, the planner identifies which of the aforementioned activities need to be performed. The outer wheel is *policy efforts* and consists of the strategies of environmental/social planning, communication/marketing, legislation, service provision, regulation, financial measures, and development of guidelines. The planner identifies the policy efforts in the wheel that will be targeted in the program. Additional information about this model is provided at http://www.behaviourchangewheel.com.

The BCW model has been applied to planning a variety of health education–related programs. Applications have targeted improving hearing-aid use (Barker, Atkins, & de Lusignan, 2016) and medication adherence (Chiang, Guo, Amico, Atkins, & Lester, 2018). The BCW model has also been used to promote physical activity (Webb, Foster, & Poulter, 2016), smoking cessation (Gould et al., 2017), and weight loss (Beleigoli et al., 2018). It has also been applied to reducing sitting time in the workplace (Munir et al., 2018) and stroke patient rehabilitation (Loft et al., 2017). **Table 2-8** summarizes these applications.

## SOCIAL-ECOLOGICAL MODELS

The social-ecological models owe their origins to the work of Urie Bronfenbrenner (1974, 1994), a developmental psychologist. He asserted that in order to understand human development, the entire ecological system must be considered. He identified five subsystems that comprise the layers of the ecological system. The first is the *microsystem,* which consists of the immediate environment, such as family, school, peer group, and worksite. The second layer, called the *mesosystem,* comprises the linkages and processes between two or more settings, such as the relationship between home and school, school and workplace, and so on. The third layer is the *exosystem,* which consists of the linkages and processes with two or more settings, one of which does not contain the person but has indirect influences on him or her. For example, in the case of a child, the relationship between the home and the father's workplace would be the exosystem. The fourth layer, the *macrosystem,* includes the culture comprising customs, lifestyles, belief systems, and so on. The final layer is the *chronosystem,* which includes changes over time in the environment. Examples would include changes over the life course in family structure, socioeconomic status, place of residence, employment, and so forth.

The ecological approach has been applied in health promotion program planning, with the acknowledgment that multiple factors influence health behavior and that these factors interact. Because of these interactions, behavior-specific, multilevel interventions are required (Golden, McLeroy, Green, Earp, & Lieberman, 2015; Sallis & Owen, 2015). A generic **social-ecological model** can be conceptualized as consisting of six levels of interventions. The first level for such interventions is the *intrapersonal level*, where individual-level factors are targeted. The second level for such interventions is the *interpersonal level*, where the interactions between individuals are targeted. The third level for such interventions is the *social level*, where social factors are targeted. The fourth level is the *cultural level*, where cultural factors are targeted. The fifth level is the *organizational level*, where organizational factors are targeted. The final level is the *policy/environmental level*, where policy-level and environmental change factors are targeted. This model is depicted in **Figure 2-3**.

Some examples of applications of social-ecological models in health promotion include the Stand Up Australia program, an intervention designed to reduce workplace sitting (Neuhaus et al., 2014); the Colorado LEAP Study, an intervention study designed to prevent early childhood obesity (Bellows et al., 2013); a worksite heart health improvement project to reduce cardiovascular disease risk factors among long-term care workers (Doran, Resnick, Kim, Lynn, & McCormick, 2017); the Louisiana Asthma Management and Prevention Program (LAMP) to create asthma-friendly schools (Nuss et al, 2016); and Healthy Living Cambridge Kids (HLCK), a multicomponent intervention targeting community, school, family, and individuals to promote healthy weight and fitness (Chomitz et al., 2010). Several review articles of interventions based on social-ecological models have also been published (Cramer & Kapusta, 2017; Davidson et al., 2018; Nyambe, Van Hal, & Kampen, 2016; Soderlund, 2017).

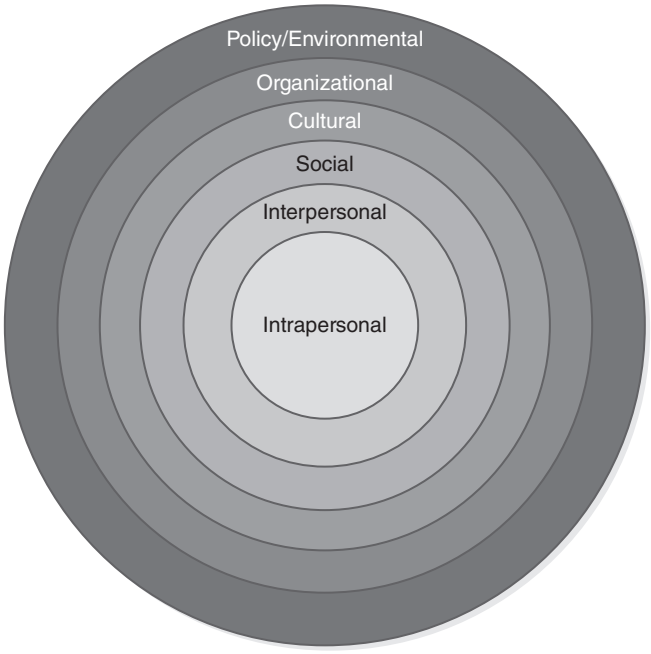



**FIGURE 2-3** Social-ecological model for planning multilevel health behavior interventions.

## OTHER MODELS

Some less commonly used models in health promotion and education are the effectiveness-based model from social work (Kettner, Moroney, & Martin, 2017), the evidence-based/risk factor analysis model (Dever, 1997), the social marketing assessment and response tool (SMART) (Neiger, Thackeray, Barnes, & McKenzie, 2003), and total quality improvement (TQI) (Batten, 1992). These models are rarely used in health promotion and health education.

## SKILL-BUILDING ACTIVITY

Let us take the most popular model for planning health education and health promotion programs, the PRECEDE-PROCEED model, and apply it to a practical situation. Let us assume we are interested in developing a physical activity promotion program for African American women in a midwestern city. **Figure 2-4** depicts each phase of the model and how it can be applied.

In the first phase, you could choose a focus group discussion with the target audience for social assessment. The focus group discussion would identify the target audience's quality-of-life concerns, common leisure time physical activities, and program expectations. In the first part of the second phase, epidemiological assessment, you could collect local data from the county health department, statewide health data, and national health data about overweight and obesity and sedentary lifestyle, and compile mortality and morbidity (incidence and prevalence) statistics of diseases associated with sedentary lifestyle. In the second part of the second phase, only a behavioral factor of moderate-intensity leisure time physical activity can be chosen from the genetic, behavioral, and environmental factors.

In the third phase, educational and ecological assessment, you can select predisposing factors of knowledge about benefits of physical activity, attitudes of self-efficacy, and decisional balance based on the stages of change model (Prochaska & DiClemente, 1983). Physically active peers can be used as reinforcing factors. In the enabling factors category, the program can build skills for aerobics and make a free class available.

In the fourth phase of administrative and policy assessment, permission and use of facilities at a local health center can be obtained, participants can be recruited at the health center, and policy changes would be planned.

In the fifth phase, program implementation, one health educator could conduct eight weekly educational sessions with 30 participants at a total cost of $5,000.

In the sixth phase, process evaluation, you could use tally sheets to gauge the degree of implementation and perform a satisfaction survey of participants.

In the seventh phase, impact evaluation, you could compare participants' knowledge and attitude scores before and after the intervention, test their skills after the intervention, and assess the acceptance and credibility of peers after the intervention. Because the program is modest and short in duration, the eighth phase of outcome evaluation cannot performed.

Using this approach, plan to work on a health issue of your choice with a target population of your choice. You can apply the PRECEDE-PROCEED model or use another model to plan your program. **Table 2-9** provides a set of questions to assist you in choosing activities that correspond to different phases of the PRECEDE-PROCEED model.

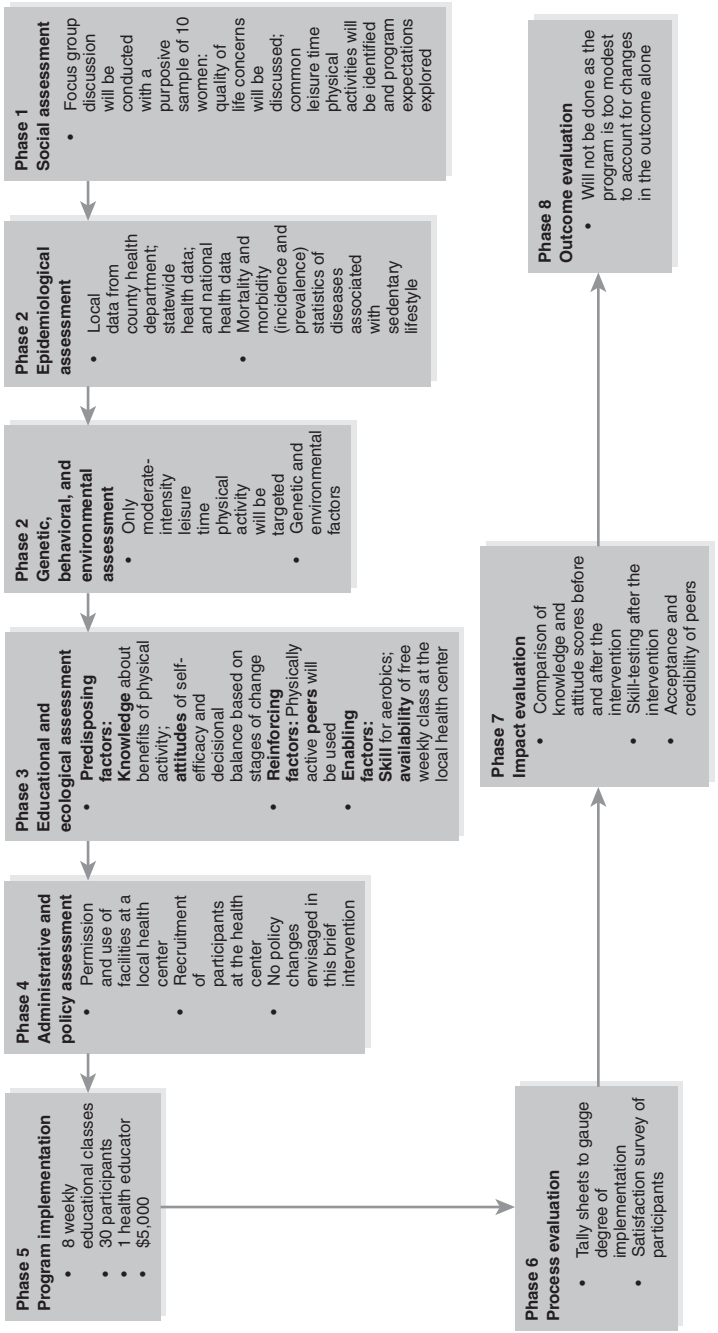



**FIGURE 2-4** Application of the PRECEDE-PROCEED model for changing moderate-intensity leisure time physical activity in a small group of African American women in a midwestern city through a brief first-time educational intervention.

**Table 2-9 Choosing Activities for Health Education Program Planning Using the PRECEDE-PROCEED Model (*continued*)**

1. What will be the best activity to facilitate social assessment?
   - Asset mapping
   - Social reconnaissance
   - Focus group discussion
   - Delphi method
   - Nominal group process
   - Central location intercept interviews
   - Surveys
   - Public service data
   - Other

2. What data will be needed to conduct epidemiological assessment?
   - Mortality data
   - Morbidity data
   - Disability data
   - Behavioral data
   - Environmental data
   - Genetic data
   - Other

3. What factors should be considered in educational and ecological assessment?
   - Predisposing
     - Knowledge
     - Beliefs
     - Attitudes
     - Values
     - Others
   - Reinforcing
     - Peers
     - Parents
     - Decision makers
     - Employers
     - Others
   - Enabling
     - Availability
     - Accessibility
     - Legislation
     - Skills
     - Others

(*continues*)

**Table 2-9 Choosing Activities for Health Education Program Planning Using the PRECEDE-PROCEED Model (*continued*)**

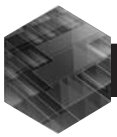
4. What should be considered in administrative and policy assessment?
   - Alignment with priorities
   - Assessment of resources
   - Identification of barriers
   - Assessment of policies
   - Other
5. What should be considered in implementation?
   - Time
   - Personnel
   - Budget
   - Other
6. What should be considered in process evaluation?
   - Degree of fidelity
   - Reception at the site
   - Recipient response
   - Implementer's response
   - Competencies of personnel
7. What should be considered in impact evaluation?
   - Predisposing antecedents
   - Reinforcing antecedents
   - Enabling antecedents
   - Behaviors
   - Environments
8. What should be considered in outcome evaluation?
   - Health status
   - Quality of life

## CASE STUDY: JOHN'S PREDICAMENT IN CHOOSING A PLANNING MODEL

John is a recent graduate from a prestigious health education program in the southern United States. One of the courses that he took was on planning models, and his professor was very fond of the PRECEDE-PROCEED model and emphasized to all his students the usefulness of this model in planning health education programs. John has also developed a liking for this model, because he got an A in this class on a paper that he wrote and presented on the model. He has recently been hired by a worksite wellness program at a large automobile manufacturing company in Mississippi with close to 6,000 employees. He has been given the mandate to design a program for stress management. His annual budget for programming is only $10,000. He wants to use the PRECEDE-PROCEED model, but feels that he does not have enough resources or time at his disposal to implement all the phases of this model. He is in a predicament as to what to do.

**QUESTIONS FOR DISCUSSION**

1. Can John conduct the social assessment phase? Why or why not?
2. Can John conduct the epidemiological assessment phase? Why or why not?
3. Can John conduct the educational and ecological assessment phase? Why or why not?
4. Can John conduct the administrative and policy assessment and intervention alignment phase? Why or why not?
5. Can John conduct the implementation phase? Why or why not?
6. Can John conduct the process evaluation phase? Why or why not?
7. Can John conduct the impact evaluation phase? Why or why not?
8. Can John conduct outcome evaluation phase? Why or why not?
9. What would be an alternative for John if he cannot implement the PRECEDE-PROCEED model?



## SUMMARY

Planning is an essential responsibility for health educators. Theories from behavioral and social sciences help in micro-level planning (setting objectives and identifying methods), but the macro-level, or overall, planning is done by models. Models are miniaturized and simplified applications of concepts for addressing problems and usually contain inputs from several theories. This chapter discussed several planning models: the PRECEDE-PROCEED model, the planned approach to community health (PATCH) model, the multilevel approach to community health (MATCH) model, the intervention mapping model, the assessment protocol for excellence in public health (APEXPH) model, the comprehensive health education model (CHEM), the model for health education planning (MHEP), the model for health education planning and resource development (MHEPRD), the PEN-3 model, CDCynergy, and social-ecological models.

The most popular model is the PRECEDE-PROCEED model, which has been applied in a variety of settings for coalition building; enhancing community participation; planning multiple-channel interventions; developing health instruments; conducting needs assessments, implementing health risk appraisals, disease prevention programs, and employee assistance programs at worksites; planning health programs in school settings; training healthcare staff; and improving self-care and compliance behaviors.

PATCH is a community health planning model that works equally well at state and local levels and builds capacity. MATCH is a model that emphasizes implementation and is feasible in situations where an extensive needs assessment cannot be performed. Intervention mapping builds on a social-ecological approach that looks at individual behaviors in an environmental context. APEXPH is a useful model at the local level. CHEM, MHEP, and MHEPRD are not commonly used, and were discussed mainly from a historical perspective. The PEN-3 model is culturally sensitive and helps in culturally appropriate planning. CDCynergy is a health communication model that has been tailored to a variety of other applications. The BCW model is a complex, cyclical health promotion program planning model that uses three wheels: sources of behavior, intervention activities, and policy efforts. Social-ecological models consider the person in an ecological environment and design interventions at multiple levels.

## IMPORTANT TERMS

analytical epidemiology
assessment protocol for excellence in public health (APEXPH) model
behavior change wheel (BCW) model
CDCynergy
comprehensive health education model (CHEM)
descriptive epidemiology
enabling factors
intervention mapping
model
model for health education planning (MHEP)
model for health education planning and resource development (MHEPRD)
multilevel approach to community health (MATCH) model
PEN-3 model
planned approach to community health (PATCH) model
PRECEDE-PROCEED model
predisposing factors
reinforcing factors
social-ecological models

## REVIEW QUESTIONS

1. Differentiate between a model and a theory.
2. Describe the PRECEDE-PROCEED model. How would you design a program to prevent smoking in adolescents using the PRECEDE-PROCEED model?
3. What are the competencies for health educators who are planning health education strategies, interventions, and programs?
4. Describe the essential features of the PATCH model.
5. Discuss the five phases of the MATCH model.
6. Identify the six steps of intervention mapping.
7. What does the acronym APEXPH stand for? Briefly discuss this model.
8. Differentiate between the comprehensive health education model and the model for health education planning.
9. Describe the PEN-3 model.
10. Summarize the main features of CDCynergy.
11. Describe the three wheels of the BCW model.
12. Describe social-ecological models. Develop a social-ecological model for promoting physical activity in college students.

## WEBSITES TO EXPLORE

### Centers for Disease Control and Prevention (CDC)

www.cdc.gov

The Centers for Disease Control and Prevention (CDC), founded in 1946, is one of the major components of the U.S. Department of Health and Human Services. As noted in the chapter, the CDC helped in the development of the PATCH model and provided funding for the APEXPH

model. The CDC website contains reliable health-related information on almost all important public health topics. *Explore this website to see the numerous activities of the CDC. Search for* APEXPH *in the site's search engine to find information about getting the APEXPH Workbook.*

### Intervention Mapping

www.interventionmapping.com

Intervention mapping is a protocol for developing effective behavior change interventions. *Explore this website. Locate the tab with publications on intervention mapping. Review a few abstracts describing applications of intervention mapping. If you are interested in this approach, you can become a member of the Intervention Mapping mailing list on this website.*

### National Association of County and City Health Officials (NACCHO)

www.naccho.org

NACCHO is the national organization representing local public health agencies. The assessment protocol for excellence in public health (APEXPH) model was developed by NACCHO. The website provides news and information about events pertaining to local health departments, programs and activities, publications and tools, public health advocacy, a press room, and membership. *In the toolbox link located at the top, review various toolkits that are available for planning health-related programs.*

### PRECEDE-PROCEED Model

www.lgreen.net/precede.htm

The PRECEDE-PROCEED model has evolved since the 1970s, using inputs from several professionals around the country. This website includes a brief history of the genesis and evolution of the model. *Explore this website to find out about the new features in the current edition of the book that describes this model.*

### Social-Ecological Model: Violence Prevention

https://www.cdc.gov/violenceprevention/publichealthissue/social-ecologicalmodel.html

This is a real-world social-ecological model developed by the CDC for violence prevention. It uses a four-level social-ecological model—individual, relationship, community, societal—to understand violence and the effect of potential prevention strategies. *Review this website and develop a social-ecological model for another health behavior.*

## REFERENCES

Aarø, L. E., Mathews, C., Kaaya, S., Katahoire, A. R., Onya, H., Abraham, C., Klepp, K. I., Wubs, A., Eggers, S. M., & de Vries, H. (2014). Promoting sexual and reproductive health among adolescents in southern and eastern Africa (PREPARE): Project design and conceptual framework. *BMC Public Health, 14,* 54. https://doi.org/10.1186/1471-2458-14-54

Abernethy, A. D., Magat, M. M., Houston, T. R., Arnold, H. L., Jr., Bjorck, J. P., & Gorsuch, R. L. (2005). Recruiting African American men for cancer screening studies: Applying a culturally based model. *Health Education and Behavior*, *32*(4), 441–451.

Airhihenbuwa, C. O. (1993). Health promotion for child survival in Africa: Implications for cultural appropriateness. *Hygie*, *12*(3), 10–15.

Airhihenbuwa, C. O. (1995). *Health and culture: Beyond the Western paradigm*. Thousand Oaks, CA: Sage Publications.

Amorrortu, R. P., Arevalo, M., Vernon, S. W., Mainous, A. G. 3rd, Diaz, V., McKee, M. D., Ford, M. E., & Tilley, B. C. (2018). Recruitment of racial and ethnic minorities to clinical trials conducted within specialty clinics: An intervention mapping approach. *Trials, 19*(1), 115. https://doi.org/10.1186/s13063-018-2507-9

Azar, F. E., Solhi, M., Darabi, F., Rohban, A., Abolfathi, M., & Nejhaddadgar, N. (2018). Effect of educational intervention based on PRECEDE-PROCEED model combined with self-management theory on self-care behaviors in type 2 diabetic patients. *Diabetes and Metabolic Syndrome*, *12*(6), 1075–1078. https://doi.org/10.1016/j.dsx.2018.06.028

Azar, F. E., Solhi, M., Nejhaddadgar, N., & Amani, F. (2017). The effect of intervention using the PRECEDE-PROCEED model based on quality of life in diabetic patients. *Electronic Physician*, *9*(8), 5024–5030. https://doi.org/10.19082/5024

Barker, F., Atkins, L., & de Lusignan S. (2016). Applying the COM-B behaviour model and behaviour change wheel to develop an intervention to improve hearing-aid use in adult auditory rehabilitation. *International Journal of Audiology*, *55*(Suppl 3), S90–S98. https://doi.org/10.3109/14992027.2015.1120894

Bartholomew Eldridge, L. K., Markham C. M., Ruiter, R. A. C., Fernandez, A. C., Kok, G., & Parcel, G. S. (2016). *Planning health promotion programs: An intervention mapping approach* (4th ed.). San Francisco: Jossey-Bass.

Bates, I. J., & Winder, A. E. (1984). *Introduction to health education*. Mountain View, CA: Mayfield.

Batten, J. D. (1992). *Building a total quality culture*. Menlo Park, CA: Crisp.

Beech, B. M., & Scarinci, I. C. (2003). Smoking attitudes and practices among low-income African-Americans: Qualitative assessment of contributing factors. *American Journal of Health Promotion*, *17*(4), 240–248.

Beleigoli, A. M., Andrade, A. Q., Diniz, M. F. H., Alvares, R. S., Ferreira, M. H., Silva, L. A., Rodrigues, M. C., Jacomassi, L., Cerqueira, A. G., Ribeiro, A. L. (2018). Using the behaviour change wheel for designing an online platform for healthy weight loss—"POEmaS." *Studies in Health Technology and Informatics*, *254*, 1–10.

Bellows, L. L., Johnson, S. L., Davies, P. L., Anderson, J., Gavin, W. J., & Boles, R. E. (2013). The Colorado LEAP study: Rationale and design of a study to assess the short term longitudinal effectiveness of a preschool nutrition and physical activity program. *BMC Public Health*, *13*, 1146.

Bridges, L., Sharma, M., Lee, J. H., Bennett, R., Buxbaum, S., & Reese-Smith, J. (2018). Using the PRECEDE-PROCEED model for an online peer-to-peer suicide prevention and awareness for depression (SPAD) intervention among African American college students: Experimental study. *Health Promotion Perspectives*, *8*(1), 15–24. https://doi.org/10.15171/hpp.2018.02

Bronfenbrenner, U. (1974). Developmental research, public policy, and the ecology of childhood. *Child Development*, *45*(1), 1–5.

Bronfenbrenner, U. (1994). Ecological models of human development. In *International encyclopedia of education* (2nd ed., Vol. *3*). Oxford: Elsevier.

Calano, B. J. D., Cacal, M. J. B., Cal, C. B., Calletor, K. P., Guce, F. I. C. C., Bongar, M. V. V., & Macindo, J. R. B. (2019). Effectiveness of a community-based health programme on the blood pressure control, adherence and knowledge of adults with hypertension: A PRECEDE-PROCEED model approach. *Journal of Clinical Nursing, 28*(9–10), 1879–1888. https://doi.org/10.1111/jocn.14787

Castellanos, D. C., & Abrahamsen, K. (2014). Using the PRECEDE-PROCEED model to assess dietary needs in the Hispanic population in northeastern Pennsylvania. *Hispanic Health Care International, 12*(1), 43–53. https://doi.org/10.1891/1540-4153.12.1.43

Centers for Disease Control and Prevention. (2010). *CDCynergy "Lite."* Retrieved from https://www.cdc.gov/healthcommunication/CDCynergyLite.html

Centers for Disease Control and Prevention. (2019). *Gateway to health communication.* Retrieved from https://www.cdc.gov/healthcommunication/.

Chang, M. W., Brown, R. L., Nitzke, S., & Baumann, L. C. (2004). Development of an instrument to assess predisposing, enabling, and reinforcing constructs associated with fat intake behaviors of low-income mothers. *Journal of Nutrition, Education and Behavior*, *36*, 27–34.

Chen, Y., Wu, F., Wu, Y., Li, J., Yue, P., Deng, Y., Lamb, K. V., Fong, S., Liu, Y., & Zhang, Y. (2019). Development of interventions for an intelligent and individualized mobile health care system to promote healthy diet and physical activity: Using an intervention mapping framework. *BMC Public Health, 19*(1), 1311. https://doi.org/10.1186/s12889-019-7639-7

Chiang, N., Guo, M., Amico, K. R., Atkins, L., Lester, R. T. (2018). Interactive two-way mHealth interventions for improving medication adherence: An evaluation using the behaviour change wheel framework. *JMIR Mhealth and Uhealth, 6*(4), e87. https://doi.org/10.2196/mhealth.9187

Chiang, L. C., Huang, J. L., Yeh, K. W., & Lu, C. M. (2004). Effects of a self-management asthma educational program in Taiwan based on PRECEDE PROCEED model for parents with asthmatic children. *Journal of Asthma*, *41*(2), 205–215.

Chomitz, V. R., McGowan, R. J., Wendel, J. M., Williams, S. A., Cabral, H. J,, King, S. E., Olcott, D. B., Cappello, M., Breen, S., & Hacker, K. A. (2010). Healthy Living Cambridge Kids: A community-based participatory effort to promote healthy weight and fitness. *Obesity*, *18*(Suppl. 1), S45–S53.

Cole, R. E., & Horacek, T. (2009). Applying precede-proceed to develop an intuitive eating nondieting approach to weight management pilot program. *Journal of Nutrition Education & Behavior*, *41*(2), 120–126.

Cole, R. E., & Horacek, T. (2010). Effectiveness of the "My Body Knows When" intuitive-eating pilot program. *American Journal of Health Behavior*, *34*(3), 286–297.

Collard, D. C., Chinapaw, M. J., van Mechelen, W., & Verhagen, E. A. (2009). Design of the iPlay study: Systematic development of a physical activity injury prevention programme for primary school children. *Sports Medicine*, *39*(11), 889–901.

Cramer, R. J., & Kapusta, N. D. (2017). A social-ecological framework of theory, assessment, and prevention of suicide. *Frontiers in Psychology, 8,* 1756. https://doi.org/10.3389/fpsyg.2017.01756

Davidson, P., Rushton, C. H., Kurtz, M., Wise, B., Jackson, D., Beaman, A., & Broome, M. (2018). A social-ecological framework: A model for addressing ethical practice in nursing. *Journal of Clinical Nursing*, *27*(5–6), e1233–e1241. https://doi.org/10.1111/jocn.14158

Dever, G. E. (1997). *Improving outcomes in public health practice: Strategy and methods*. Gaithersburg, MD: Aspen.

Doran, K., Resnick, B., Kim, N., Lynn, D., & McCormick, T. (2017). Applying the social ecological model and theory of self-efficacy in the worksite heart health improvement Project-PLUS. *Research and Theory for Nursing Practice, 31*(1), 8-27. https://doi.org/10.1891/1541-6577.31.1.8

Ekhtiari, Y. S., Shojaeizadeh, D., Foroushani, A. R., Ghofranipour, F., & Ahmadis, B. (2014). Effect of an intervention on attitudes towards domestic violence among Iranian girls. *Journal of Pakistan Medical Association*, *64*(9), 987–992.

Erwin, D. O., Johnson, V. A., Feliciano-Libid, L., Zamora, D., & Jandorf, L. (2005). Incorporating cultural constructs and demographic diversity in the research and development of a Latina breast and cervical cancer education program. *Journal of Cancer Education*, *20*(1), 39–44.

Erwin, D. O., Johnson, V. A., Trevino, M., Duke, K., Feliciano, L., & Jandorf, L. (2007). A comparison of African American and Latina social networks as indicators for culturally tailoring a breast and cervical cancer education intervention. *Cancer*, *109*(2 Suppl.), 368–377.

Fernandez, M. E., Gonzales, A., Tortolero-Luna, G., Partida, S., & Bartholomew, L. K. (2005). Using intervention mapping to develop a breast and cervical cancer screening program for Hispanic farmworkers: Cultivando La Salud. *Health Promotion Practice*, *6*(4), 394–404.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, MA: Addison Wesley.

Garces, I. C., Scarinci, I. C., & Harrison, L. (2006). An examination of sociocultural factors associated with health and health care seeking among Latina immigrants. *Journal of Immigrant and Minority Health*, *8*(4), 377–385.

Garcia, M. L., Gatdula, N., Bonilla, E., Frank, G. C., Bird, M., Rascón, M. S., & Rios-Ellis, B. (2019). Engaging intergenerational Hispanics/Latinos to examine factors influencing childhood obesity using the PRECEDE-PROCEED model. *Maternal and Child Health Journal*, *23*(6), 802–810. https://doi.org/10.1007/s10995-018-02696-y

Gold, R. S., Green, L. W., & Kreuter, M. W. (1998). *EMPOWER: Enabling methods of planning and organizing within everyone's reach*. Sudbury, MA: Jones & Bartlett Learning.

Golden, S. D., McLeroy, K. R., Green, L. W., Earp, J. A., & Lieberman, L. D. (2015). Upending the social ecological model to guide health promotion efforts toward policy and environmental change. *Health Education & Behavior*, *42*(1 Suppl.), 8S–14S.

Goodman, R. M., Steckler, A., Hoover, S., & Schwartz, R. (1993). A critique of contemporary community health promotion approaches: Based on a qualitative review of six programs in Maine. *American Journal of Health Promotion*, 7(3), 208–220.

Gould, G. S., Bar-Zeev, Y., Bovill, M., Atkins, L., Gruppetta, M., Clarke, M. J., & Bonevski, B. (2017). Designing an implementation intervention with the behaviour change wheel for health provider smoking cessation care for Australian Indigenous pregnant women. *Implement Science*, *12*(1), 114. https://doi.org/10.1186/s13012-017-0645-1

Green, L. W. (1970). Identifying and overcoming barriers to the diffusion of knowledge about family planning. *Advances in Fertility Control*, *5*, 21–29.

Green, L. W. (1974). Toward cost-benefit evaluations of health education: Some concepts, methods and examples. *Health Education Monographs*, *2*(Suppl. 1), 34–64.

Green, L. W., & Kreuter, M. W. (2005). *Health program planning: An educational and ecological approach* (4th ed.). Boston: McGraw-Hill.

Green, L. W., Kreuter, M. W., Deeds, S. G., & Partridge, K. B. (1980). *Health education planning: A diagnostic approach*. Palo Alto, CA: Mayfield.

Green, L. W., Levine, D. M., & Deeds, S. G. (1975). Clinical trials of health education for hypertensive outpatients: Design and baseline data. *Preventive Medicine*, *4*, 417–425.

Green, L. W., Levine, D. M., Wolle, J., & Deeds, S. G. (1979). Development of randomized patient education experiments with urban poor hypertensives. *Patient Counseling and Health Education*, *1*, 106–111.

Heinen, M. M., Bartholomew, L. K., Wensing, M., Kerkhof, P., & Achterberg, T. (2006). Supporting adherence and healthy lifestyles in leg ulcer patients: Systematic development of the Lively Legs program for dermatology outpatient clinics. *Patient Education and Counseling*, *61*(2), 279–291.

Hochbaum, G. M. (1958). *Public participation in medical screening programs: A sociopsychological study* (PHS Publication No. 572). Washington, DC: U.S. Government Printing Office.

Hu, J., Wallace, D. C., Jones, E., & Liu, H. (2009). Cardiometabolic health of Chinese older adults with diabetes living in Beijing, China. *Public Health Nursing*, *26*(6), 500–511.

Iwelunmor, J., Newsome, V., & Airhihenbuwa, C. O. (2014). Framing the impact of culture on health: a systematic review of the PEN-3 cultural model and its application in public health research and interventions. *Ethnicity & Health, 19*(1), 20–46. https://doi.org/10.1080/13557858.2013.857768

James, D. C. (2004). Factors influencing food choices, dietary intake, and nutrition-related attitudes among African Americans: Application of a culturally sensitive model. *Ethnicity and Health*, *9*(4), 349–367.

Kalokhe, A. S., Iyer, S., Katendra, T., Gadhe, K., Kolhe, A. R., Paranjape, A., Del Rio, C., Stephenson, R., & Sahay, S. (2019). Primary prevention of intimate partner violence among recently married dyads residing in the slums of Pune, India: Development and rationale for a dyadic intervention. *JMIR Research Protocols*, *8*(1), e11533. https://doi.org/10.2196/11533

Kalos, A., Kent, L., & Gates, D. (2005). Integrating MAPP, APEXPH, PACE-EH, and other planning initiatives in Northern Kentucky. *Journal of Public Health Management and Practice*, *11*(5), 401–406.

Kang, J. H., Han, H. R., Kim, K. B., & Kim, M. T. (2006). Barriers to care and control of high blood pressure in Korean-American elderly. *Ethnicity and Disease*, *16*(1), 145–151.

Kannan, S., Sparks, A. V., Webster, J. D., Krishnakumar, A., & Lumeng, J. (2010). Healthy eating and Harambee: Curriculum development for a culturally-centered bio-medically oriented nutrition education program to reach African American women of childbearing age. *Maternal and Child Health Journal*, *14*(4), 535–547.

Ka'opua, L. S. (2008). Developing a culturally responsive breast cancer screening promotion with Native Hawaiian women in churches. *Health & Social Work*, *33*(3), 169–177.

Kettner, P., Moroney, R., & Martin, L. (2017). *Designing and managing programs: An effectiveness based approach* (5th ed.). Thousand Oaks, CA: Sage.

Kline, K. N. (2007). Cultural sensitivity and health promotion: Assessing breast cancer education pamphlets designed for African American women. *Health Communication*, *21*(1), 85–96.

Kreuter, M. W. (1992). PATCH: Its origin, basic concepts, and links to contemporary public health policy. *Journal of Health Education*, *23*(3), 135–139.

Larson, E. L., Cohn, E. G., Meyer, D. D., & Boden-Albala, B. (2009). Consent administrator training to reduce disparities in research participation. *Journal of Nursing Scholarship*, *41*(1), 95–103.

Lengerich, E. J., Kluhsman, B. C., Bencivenga, M., Allen, R., Miele, M. B., & Farace, E. (2007). Development of community plans to enhance survivorship from colorectal cancer: Community-based participatory research in rural communities. *Journal of Cancer Survivorship*, *1*(3), 205–211.

Li, Y., Cao, J., Lin, H., Li, D., Wang, Y., & He, J. (2009). Community health needs assessment with precede-proceed model: A mixed methods study. *BMC Health Services Research*, *9*, 181.

Linnan, L. A., Sterba, K. R., Lee, A. M., Bontempi, J. B., Yang, J., & Crump, C. (2005). Planning and the professional preparation of health educators: Implications for teaching, research, and practice. *Health Promotion Practice*, *6*, 308–319.

Loft, M. I., Martinsen, B., Esbensen, B. A., Mathiesen, L. L., Iversen, H. K., & Poulsen, I. (2017). Strengthening the role and functions of nursing staff in inpatient stroke rehabilitation: Developing a complex intervention using the Behaviour Change Wheel. *International Journal of Qualitative Studies on Health and Well-being*, *12*(suppl2), 1392218. https://doi.org/10.1080/17482631.2017.1392218

McEwen, S. E., Davis, A. M., Jones, J. M., Martino, R., Poon, I., Rodriguez, A. M., & Ringash, J. (2015). Development and preliminary evaluation of a rehabilitation consult for survivors of head and neck cancer: An intervention mapping protocol. *Implementation Science*, *10*(1), 6.

McInvale Trejo, K., & Shaw-Ridley, M. (2019). Barriers and enablers to nutrition and physical activity in Lima, Peru: An application of the PEN-3 cultural model among families living in pueblos jóvenes. *Ethnicity & Health*, *14*, 1–11. https://doi.org/10.1080/13557858.2019.1591347

Mérida Rios, L., Márquez Serrano, M., Jiménez Aguilar, A., Barboza Chacón, L., Rueda Neria, C. M., & Arenas Monreal, L. (2019). Promoting fruit, vegetable and simple water consumption among mothers and teachers of preschool children: An intervention mapping initiative. *Evaluation & Program Planning, 76,* 101675. https://doi.org/10.1016/j.evalprogplan.2019.101675

Michie, S., Atkins, L., & West R. (2014). *The behaviour change wheel: A guide to designing interventions*. Great Britain, UK. Silverback Publishing.

Michie, S., Van Stralen, M. M., & West, R. (2011). The behaviour change wheel: A new method for characterising and designing behaviour change interventions. *Implementation Science*, *6*(1), 42. https://doi.org/10.1186/1748-5908-6-42

Mkumbo, K., Schaalma, H., Kaaya, S., Leerlooijer, J., Mbwambo, J., & Kilonzo G. (2009). The application of intervention mapping in developing and implementing school-based sexuality and HIV/AIDS education in a developing country context: The case of Tanzania. *Scandinavian Journal of Public Health*, *37*(Suppl. 2), 28–36.

Moghaddam, E. S., Shahnazi, H., & Hassanzadeh, A. (2019). Predictive power of PEN-3 model constructs in breast cancer screening behaviors among teachers: A cross-sectional study in Central Iran. *European Journal of Breast Health*, *15*(2), 105–110. https://doi.org/10.5152/ejbh.2019.4417

Moore, P. V., & Short, J. (1994). Planning a continuing education program: The model for health education planning. *AAOHN Journal*, *42*(9), 430–434.

Munir, F., Biddle, S. J. H., Davies, M. J., Dunstan, D., Esliger, D., Gray, L. J., Jackson, B. R., O'Connell, S. E., Yates, T., Edwardson, C. L.(2018). Stand More AT Work (SMArT Work): Using the behaviour change wheel to develop an intervention to reduce sitting time in the workplace. *BMC Public Health, 18*(1), 319. https://doi.org/10.1186/s12889-018-5187-1

Naghibi, S. A., Shojaizadeh, D., Montazeri, A., & Yazdani Cherati, J. (2015). Sociocultural factors associated with breast self-examination among Iranian women. *Acta Medica Iranica*, *53*(1), 62–68.

National Association of County and City Health Officials. (1991). *Assessment Protocol for Excellence in Public Health (APEXPH) workbook*. Washington, DC: Author.

National Commission for Health Education Credentialing. (2019). *Health education job analysis projects*. Retrieved from https://www.nchec.org/HESPA

Neiger, B. L., Thackeray, R., Barnes, M. D., & McKenzie J. F. (2003). Positioning social marketing as a planning process for health education. *American Journal of Health Studies*, *18*(2/3), 75–81.

Neuhaus, M., Healy, G. N., Fjeldsoe, B. S., Lawler, S., Owen, N., Dunstan, D.W., LaMontagne, A. D., & Eakin, E. G. (2014). Iterative development of Stand Up Australia: A multi-component intervention to reduce workplace sitting. *International Journal of Behavioral and Nutritional Physical Activity*, *11*, 21.

Nuss, H. J., Hester, L. L., Perry, M. A., Stewart-Briley, C., Reagon, V. M., & Collins, P. (2016). Applying the social ecological model to creating asthma-friendly schools in Louisiana. *Journal of School Health, 86*(3), 225–232. https://doi.org/10.1111/josh.12369.

Nyambe, A, Van Hal, G., & Kampen, J. K. (2016). Screening and vaccination as determined by the social ecological model and the theory of triadic influence: A systematic review. *BMC Public Health, 16*(1), 1166.

Peplow, D., & Augustine, S. (2017). Intervention mapping to address social and economic factors impacting indigenous people's health in Suriname's interior region. *Globalization & Health, 13*(1), 11. https://doi.org/10.1186/s12992-017-0238-4

Perez, A., & Fleury, J. (2018). Using a cultural framework to assess motivation for physical activity among older Hispanic women: Application of the PEN-3 Model. *Family & Community Health*, *41*(1), 10–17. https://doi.org/10.1097/FCH.0000000000000176

Prochaska, J. O., & DiClemente, C. C. (1983). Stages and processes of self change of smoking: Toward an integrative model of change. *Journal of Consulting and Clinical Psychology*, *51*, 390–395.

Rezapour, B., Mostafavi, F., & Khalkhali, H. R. (2016). School-based and PRECEDE-PROCEED-model intervention to promote physical activity in the high school students: Case study of Iran. *Global Journal of Health Science*, *8*(9), 54497. https://doi.org/10.5539/gjhs.v8n9p271

Rosenstock, I. M., Derryberry, M., & Carriger, B. (1959). Why people fail to seek poliomyelitis vaccination. *Public Health Reports*, *74*, 98–103.

Ross, H., & Mico, P. (1980). *Theory and practice in health education*. Palo Alto, CA: Mayfield.

Sallis, J.F., & Owen, N. (2015). Ecological models of health behavior. In K. Glanz, B. K. Rimer, & K. Viswanath (Eds.), *Health behavior and health education. Theory, research, and practice* (5th ed., pp. 43–64). San Francisco: Jossey-Bass.

Shaha, M., Wüthrich, E., Stauffer, Y., Herczeg, F., Fattinger, K., Hirter, K., Papalini, M., & Herrmann, L. (2015). Implementing evidence-based patient and family education on oral anticoagulation therapy: A community-based participatory project. *Journal of Clinical Nursing*, *24*(11–12), 1534–1545.

Simons-Morton, B. G., Greene, W. H., & Gottlieb, N. H. (1995). *Introduction to health education and health promotion* (2nd ed.). Prospect Heights, IL: Waveland.

Soderlund, P. D. (2017). The social ecological model and physical activity interventions for Hispanic women with Type 2 Diabetes: A review. *Journal of Transcultural Nursing, 28*(3), 306-314. https://doi.org/10.1177/1043659616649671.

Song, M., Choi, S., Kim, S. A., Seo, K., & Lee, S. J. (2015). Intervention mapping protocol for developing a theory-based diabetes self-management education program. *Research & Theory for Nursing Practice*, *29*(2), 94–112.

Suen, J., Christenson, G. M., Cooper, A., & Taylor, M. (1995). Analysis of the current status of public health practice in local health departments. *American Journal of Preventive Medicine*, *11*(Suppl. 6), 51–54.

Sullivan, D. (1973). Model for comprehensive, systematic program development in health education. *Health Education Report*, *1*(1), 4–5.

Thompson, M. E., Dorian, A. H., & Harutyunyan, T. L. (2010). Identifying priority healthcare trainings in frozen conflict situations: The case of Nagorno Karabagh. *Conflict & Health*, *4*(1), 21.

Turnock, B. J., Handler, A., Hall, W., Lenihan, D. P., & Vaughn, E. (1995). Capacity-building influences on Illinois local health departments. *Journal of Public Health Management and Practice*, *1*(3), 50–58.

U.S. Department of Health and Human Services. (2005). *Planned Approach to Community Health: Guide for the local coordinator*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion. Retrieved from https://www.sophe.org/resources/planned-approach-community-health-patch-guide-local-coordinator/

U.S. Department of Health and Human Services. (2019). *Development of the National Health Promotion and Disease Prevention Objectives for 2030*. Retrieved from https://www.healthypeople.gov/2020/About-Healthy-People/Development-Healthy-People-2030

van Stralen, M. M., de Vries, H., Mudde, A. N., Bolman, C., & Lechner, L. (2009). The working mechanisms of an environmentally tailored physical activity intervention for older adults: A randomized controlled trial. *International Journal of Behavioral Nutrition and Physical Activity*, *6*, 83.

Vaughn, E. H., Richards, T. B., Christenson, G. M., Taylor, M. S., & Eyster, J. (1994). An information manager for the Assessment Protocol for Excellence in Public Health. *Public Health Nursing*, *11*(6), 399–405.

Verweij, L. M., Proper, K. I., Weel, A. N., Hulshof, C. T., & van Mechelen, W. (2009). Design of the Balance Systematic development, evaluation and implementation of an occupational health guideline aimed at the prevention of weight gain among employees. *BMC Public Health*, *9*, 461.

Webb, J., Foster, J., & Poulter, E. (2016). Increasing the frequency of physical activity very brief advice for cancer patients. Development of an intervention using the behaviour change wheel. *Public Health, 133,* 45-56. https://doi.org/10.1016/j.puhe.2015.12.009

Webster, J. D., & Airhihenbuwa, C. O. (2005). *PEN-3 model: A cultural framework for organizing CBPR principles and practice.* Paper presented at 133rd Annual Meeting of American Public Health Association. Retrieved from http://apha.confex.com/apha/133am/techprogram/paper_107991.htm

White, K., Garces, I. C., Bandura, L., McGuire, A. A., & Scarinci, I. C. (2012). Design and evaluation of a theory-based, culturally relevant outreach model for breast and cervical cancer screening for Latina immigrants. *Ethnicity & Disease*, *22*(3), 274–280.

Wilkens, P. M. (2003). Preventing work-related musculoskeletal disorders in VDT users: A comprehensive health promotion program. *Work*, *20*(3), 171–178.

Williams, M., Moneyham, L., Kempf, M. C., Chamot, E., & Scarinci, I. (2015). Structural and sociocultural factors associated with cervical cancer screening among HIV-infected African American women in Alabama. *AIDS Patient Care and STDS*, *29*(1), 13–19.