2. Methods

Broadly, this environmental scan comprised three primary activities:

1) **Literature review**. The literature review included a scoping review of peer-reviewed publications and a search of grey literature.
2) **Stakeholder surveys**. Primary data collection was performed through web-based surveys of three groups of public health stakeholders.
3) **Key informant interviews**. We conducted key informant interviews of selected stakeholders identified from the previous two activities.

Literature Review

Search Strategy

We identified material for the literature review from the following sources:

1) Database searches for peer-reviewed research publications
2) Current state oral health plans
3) Grey literature, including conference proceedings and technical reports

Database searches

PubMed searches were conducted for each chronic disease and risk factor using the additional Medical Subject Headings (MeSH) terms and search parameters listed below (**Table 1**). Google Scholar searches were also performed using the same terms, along with multiple variations of each (e.g., cardiovascular diseases and heart disease). Titles and abstracts were reviewed for inclusion; results were limited to studies or programs conducted in the United States. Reference lists from these articles, along with other related articles that did not meet our inclusion criteria (e.g., international programs), were reviewed in order to identify additional publications.

State oral health plans

We conducted a review of current state oral health plans to identify whether integration was addressed by the state oral health program. We defined current plans as any document valid from 2015 onwards, as of July 2017 when the search was performed. State oral health plans were identified from the CDC Division of Oral Health's clearinghouse of state oral health plans (available at https://www.cdc.gov/oralhealth/state_programs/oh_plans/). If a state did not have an oral health plan listed, a web search was performed to identify whether an oral health plan existed elsewhere. Documents were reviewed to identify whether they specifically addressed any chronic condition of interest (e.g., diabetes, hypertension, cardiovascular disease) or common risk factors (e.g., obesity, nutrition, tobacco use).

Table 1. Examples of Search Terms Used in PubMed and Targeted Web Search

Risk factors and chronic diseases	Diabetes mellitus (includes prediabetic state, gestational diabetes) Cardiovascular diseases Hypertension Maternal health, maternal health services Obesity Tobacco use Tobacco use cessation
Intervention	Public health Primary health care
Dental outcome	Dental care Oral health Periodontal diseases Periodontitis

Grey literature

Web searches were conducted by inputting various combinations of these and related terms (e.g., "diabetes and oral health intervention") in the Google search engine. Presentations from annual National Oral Health Conference (NOHC) meetings (available at http://www.

nationaloralhealthconference.com/index.php?page=presentations) from 2012 through 2016 were reviewed. Presentation titles and slides were screened to identify potential topics of interest. The Association of State and Territorial Dental Directors (ASTDD) Best Practice Approach Reports and State Activities were reviewed by keyword searches followed by a review of full listings of activities by topic. Additional websites from various medical and dental organizations, including ASTDD, Agency for Healthcare Research and Quality (AHRQ), and American Association of Pediatric Dentistry, were also reviewed to identify interventions.

Search criteria

We applied the following parameters to our literature search:

- English language
- Location limited to the United States
- No target population or age group limitations
- 1995 to present
- Human subjects

Additional search criteria:

- Articles must describe a specific activity that linked medical and dental health.
- Articles that mentioned medical-dental integration in passing (e.g., the importance of treating periodontal disease in patients with diabetes) were excluded if they did not include information about a specific mechanism to address these two disease entities.
- We excluded editorials and opinion pieces from all sources, including review articles and position papers that advocated for medical-dental integration.

Data Collection

After identifying programs, we summarized information using an online form developed in REDCap (Research Electric Data Capture), a secure web application for managing surveys and databases. A modified form of the Community Guide Data Abstraction framework from the Community Preventive Service Task Force was created to classify and describe integrated programs.[6] This modified instrument is provided in Appendix A. Data elements broadly included:

- **Program setting and scope**—type of organization implementing the program (clinical organization, public health agency, academic organization, community-based organization, etc.) and target population.
- **Program characteristics**—what services are delivered, how the program is being implemented, who is being targeted, and where the program is implemented (hospital, clinic, community-based organization, community, etc.).
- **Program components**—broadly categorized into provision of information, behavioral interventions, environmental interventions, legislation or regulation, clinical interventions, and public health or medical care system interventions.
- **Risk factors and chronic diseases targeted**—programs are categorized as self-reported. For example, if a program's stated objective was to target obesity by reducing sugar-sweetened beverage consumption, we included it in the section related to obesity, even though an argument could be made that this intervention could also contribute to reductions in diabetes or early childhood caries.
- **Feasibility**—including costs, potential harms, other benefits, implementation, community acceptance, and other key issues.

Elements describing program quality were captured using the Reach, Effectiveness, Adoption, Implementation and Maintenance (RE-AIM) framework.[7] Items from this framework were modified as relevant to this project and incorporated into the data collection form.

Surveys

A series of surveys was designed through an iterative process in collaboration with ASTDD to

capture information about current activities of interest, examples of medical-dental collaboration, and to identify targets for key informant interviews. Three web-based surveys were administered in February and March 2017. An initial invitation to participate in each survey was followed by two reminder emails sent at one-week intervals.

Survey 1. State oral health programs

In collaboration with ASTDD, this survey was administered to state and territorial oral health programs. Respondents were asked about integrated activities and collaboration with state chronic disease programs, along with barriers and funding sources for collaboration. The complete survey instrument is provided in Appendix B.

Survey 2. State chronic disease programs

In collaboration with the National Association of Chronic Disease Directors, this survey was administered to state chronic disease directors. Respondents were asked about activities conducted in collaboration with their state oral health counterparts and perceived barriers to collaboration (Appendix C).

Survey 3. Community dental programs

This survey was administered to local dental programs via the Community Oral Health Programs Discussion List—a subscription-based email forum for the American Association for Community Dental Programs. Since there are no requirements or restrictions for subscribing, this list contains a very diverse and self-selected group of local programs. Respondents were broadly asked about population served, clinical services provided by dental providers, oral health services provided by medical providers, and health promotion and education activities (Appendix D).

Key Informant Interviews

The purpose of the key informant interviews was to obtain in-depth information regarding the quality of programs or organizations beyond what was collected during the literature review and surveys. Three iterative rounds of interviews were conducted to sample programs across the major settings we identified in the literature review and surveys: state oral health programs, community-based organizations, and medical care systems. Specific targets for interview subjects were selected in collaboration with ASTDD. These were selected for diversity across dimensions represented by the modified Community Guide Data Abstraction framework. Specifically, we selected participants to maximize diversity across disease/risk factor targets (e.g., diabetes, cardiovascular disease, tobacco use, etc.) and activity settings (e.g., community-based organizations, medical care systems, etc.). Programs that appeared promising but had few published details were selected as targets.

Interviews were conducted between July and September 2017 by a single investigator (LT). Interview participants were initially contacted by email with a brief description of the environmental scan, acknowledgement of the research team's interest in their program, and a request to arrange a 10- to 30-minute phone call to discuss the specific program. The interview guide was based on the RE-AIM framework to capture information about program quality (Appendix E). Interviews were recorded, transcribed, and analyzed to highlight pertinent details. Data extraction was performed using a worksheet that highlighted key issues related to program design, quality assessment, and sustainability.