

Appendix A

Development of the BE Tool

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This section describes the background for developing the BE Tool, the expert input process, and the sources for the questions and response choices in the tool, along with modifications made to standardize the tool.

Background

The impetus for the development of the BE Tool was related to requests by DCH awardees for a tool that assesses features of the built environment related specifically to health behaviors that impact obesity. A wide array of tools exists for measuring different features of the built environment, many of them well validated. However, it is often difficult for DCH's local program staff and evaluators to know which features of the built environment are most important to measure on the basis of the health behaviors and outcomes they are trying to affect. It is also difficult to know which tool or tools to choose to best assess those features, and the feasibility of assessing them given limited resources. For this reason, the BE Tool was developed to provide an observational tool that DCH awardees and others can use to assess core features of the built environment related specifically to health behaviors that impact obesity.

This effort builds on a CDC-funded project that reviewed the existing built environment assessment tools to determine which features of the built environment are measured by these tools; which tools measured which features; and which tools are well validated (UIC, 2009). We used the list of built environment features from the UIC report, supplemented by subject matter experts, to guide the expert input process.

Expert Input Process

The team that developed this tool recruited a group of experts in subjects such as measuring the built environment, the built environment and physical activity, food systems, planning, injury/violence, and obesity. The list of experts who provided input can be found in Appendix B.

The project team developed an initial list of built environment features was based on the four major areas (built environment infrastructure, walkability, bikeability, and recreational sites and structures) identified in the UIC report. A list of domains and sub-domains for each major area as identified by UIC was included, plus additional built environment features related to the food environment and injury/violence.

The project team sent the list of built environment features to the experts and asked them to select which features to include in the BE Tool. Key considerations included whether each built environment feature affects health-related behaviors and outcomes; whether it is an objective measure; and whether it is best measured through direct observation. Experts were also encouraged to identify additional built environment features for potential inclusion.

The expert input process had two goals: (1) to provide input on which features of the built environment should be measured by the tool; and (2) which questions/responses best measure each of the built environment features included in the tool. The expert input process had three main steps to achieve the goals:

1. Experts were provided with the list of built environment features in a format that allowed them to provide the following input, when possible:
 - a. Importance for inclusion in the tool
 - b. Health behaviors related to each feature

- c. Health outcomes related to each feature
 - d. Publications that provide evidence for inclusion of each feature
 - e. Existing assessment tools that measure each feature
2. The second step of expert input was a series of moderated group telephone discussions/Webinars about the compiled written input from step one, to clarify and further explore the rationale for inclusion of built environment features. The result of the first two steps of expert input was a final list of built environment features the tool should measure. The first two steps of expert input also provided a handful of new built environment features the tool should measure that were not included in the original list, such as features related to injury/violence and the food environment.
 3. The project team then reviewed a wide variety of existing built environment observational assessment tools and pulled relevant questions from them for each built environment feature. This list of possible questions and responses for each feature was sent to the experts to provide input on which question (or set of questions) best measures that feature. Experts also were provided space to offer comments or suggestions for modifications for any question selected. This third step of input was compiled and used to select the questions and responses to include in the tool.

The questions and responses were further refined in the process of finalizing the BE Tool. These refinements primarily had to do with adding clarifying language; modifying questions to match the overall format of the tool; and changing the format of response options to measure both sides of each street segment separately, when applicable. The questions and responses included in the BE Tool were adapted from a set of five existing built environment assessment tools, in order to build on validation work completed by the teams that developed the existing tools.

Sources

The third step of expert input helped to select questions for each built environment feature. The questions selected for inclusion in the BE Tool were adapted from five existing built environment assessment tools. For further information, links to the Web sites for these tools can be found in Appendix C.

- MAPS (Microscale Audit of Pedestrian Streetscapes)
- PRC-HAN (Prevention Research Centers Healthy Aging Research Network) Environmental Audit Tool
- Analytic Audit Tool (St. Louis University)
- QPAT (Quick Pathways Accessibility Tool)
- BRAT-DO (Bedimo-Rung Assessment Tools – Direct Observation)

The top three tools from which questions were taken are closely related to each other. The PRC-HAN tool and MAPS tool were developed as refinements of the Analytic Audit Tool, with the MAPS tool also building on the PRC-HAN tool. Because of this progression of refinement and validation, and through our process of expert input, we found that the MAPS tool was the best source for questions, response options, and well-developed scoring guidance. A majority of questions taken from the MAPS tool, however, were modified so that the response options were from MAPS but the response format was similar to PRC-HAN, in order to rate both sides of the street segment separately for certain items. This modification was made because for some features of the built environment the MAPS tool only assesses one side of the street, and many of these features are related to walkability and bikability (e.g., sidewalks, bike lanes, curb cuts),

which the BE Tool will assess on both block faces of the street segment. A smaller number of questions were taken from the PRC-HAN tool and Analytic Audit Tool; the QPAT tool was used for the basis of a question related to curb cut accessibility; and the BRAT-DO tool was used for a question on park amenities.

There are 81 total questions in the BE Tool, 65 of which are distinct questions not repeated. The last 13 questions in the tool (questions 66–78; Intersection 2) are a repeat of questions 2–14 (Intersection 1), those having to do with the intersection and crossing. This repetition of questions is to assess the intersection and crossing at both ends of the street segment. A large majority of the distinct questions in the BE Tool were taken from the MAPS tool. The following figure shows the number and percentages of BE Tool questions taken from the five source tools, and how many were modified or used as is.

- 65 Distinct questions in the BE Tool
- 46 Questions from MAPS
 - » 19 had no modifications from the MAPS tool.
 - » 21 had the response option format changed to one similar to PRC-HAN, which measures each side of the street separately for certain built environment features.
 - » 6 had changes to wording in the question or response options, or in clarifying language.
- 9 Questions from PRC-HAN
 - » 6 had no modifications from the PRC-HAN tool.
 - » 3 had changes to wording in the question or response options, or in clarifying language.
- 7 Questions from Analytic Audit Tool
 - » All 7 had the response option format changed to one similar to PRC-HAN, which measures both sides of the street separately for certain built environment features.
- 1 Question adapted from QPAT
 - » The question is an adaptation of a question from the QPAT tool, with the question and response options modified to address ADA-compliance with curb ramp slope, and with response option format changed to measure both sides of the street separately.
- 3 Questions from BRAT-DO
 - » These questions were not changed from the BRAT-DO tool.
- 1 New question
 - » The new question is an adaptation of parts of a question from the MAPS and PRC-HAN tools.

Each of these tools is an excellent resource, with the MAPS tool as the most advanced in its development of detailed data collection, management, and analysis processes and resources. See Appendix C for links to resources on these source tools. The primary difference between the BE Tool and these other tools is that the specific set of built environment features being measured by the BE Tool was chosen through an expert input process to be directly related to obesity, and the method of field data collection is segment-based rather than route-based. The BE Tool is an amalgam of these source tools, but draws most heavily on the MAPS tool. Table 1 lists the source of each question included in the tool, along with any modifications made to the questions or responses.

Table 1 – Source Tools for BE Tool Questions, with Modification Made

Questions #	Source	Modifications
1	MAPS	None
2–3	PRC-HAN	None
4	PRC-HAN	“None of the above” added as option (from MAPS).
5	MAPS	None
6	MAPS	“Features” changed to “crossing features.”
7–11	MAPS	None
12	New Question	New question wording, adapted from PRC-HAN and MAPS. Response options modified to count tactile paving (truncated domes) on curb cuts.
13	MAPS	Words (in question cell) added to clarify purpose of question.
14	QPAT	Question adapted from QPAT, but changed to include curb ramp slope options in addition to curb ramp broken area options. Response options format modified to assess both sides of the street.
15	MAPS	None
16	PRC-HAN	None
17	MAPS	None
18	MAPS	Response option “special zone (school, construction)” changed to “special school zone,” to address SRTS recommendations.
19	MAPS	Next to drainage ditches, changed to count “both sides of street.”
20	PRC-HAN	None
21	PRC-HAN	Clarifying language about benches added from MAPS tool. Response options added to determine if covered shelter has room for mobility device.
22	MAPS	Added response option “bicycle rack(s) in front of school” to address SRTS recommendations.
23–24	MAPS	None
25–28	MAPS	Response options format modified to assess both sides of the street.
29–31	MAPS	None
32–34	MAPS	Response options format modified to assess both sides of the street.
35–36	MAPS	None
37	MAPS	Response options changed from “Yes/No” to “None, N/E, or S/W,” to assess both sides of the street.
38	MAPS	Response option “3–5 ft” changed to “3 to <5” and “>5 ft” changed to “≥5 ft,” for more accuracy. Response options format modified to assess both sides of the street.
39	PRC-HAN	None
40	MAPS	Response option “3–5 ft” changed to “3 to <5” and “>5 ft” changed to “≥5 ft,” for more accuracy. Response options format modified to assess both sides of the street.
41	MAPS	Response options format modified to assess both sides of the street.

Table 1 – Source Tools for BE Tool Questions, with Modification Made (continued)

Questions #	Source	Modifications
42	MAPS	Question and response options taken from MAPS, but categories of minor and major removed and responses formatted to assess both sides of the street.
43	MAPS	The question is from MAPS, but the response options and response format are from PRC-HAN.
44–45	MAPS	Response options format modified to assess both sides of the street.
46	PRC-HAN	None
47–50	MAPS	Response options format modified to assess both sides of the street.
51	MAPS	None
52	PRC-HAN	Clarifying language from MAPS added. Removed words “from both sides” from the question, because response options measure each side separately.
53	MAPS	Response options format modified to assess both sides of the street.
54	Analytic Audit Tool	Response options format modified to assess both sides of the street.
55	MAPS	Response options changed from yes/no to none, N/E, or S/W, to assess both sides of street.
56	Analytic Audit Tool	Response options format modified to assess both sides of the street.
57	Analytic Audit Tool	Added the words “in bike lane.” Response options format modified to assess both sides of the street.
58	Analytic Audit Tool	Removed the words “non-concrete” from the question. Response options format modified to assess both sides of the street.
59	Analytic Audit Tool	Response option >6 ft changed to ≥ 6 ft. Response options format modified to assess both sides of the street.
60–61	Analytic Audit Tool	Response options format modified to assess both sides of the street.
62–63	MAPS	None
64	MAPS / PRC-HAN	Added food environment options of community garden, farmer’s market, green carts, food trucks. Recreation facilities options taken from PRC-HAN, with MAPS scale.
65	BRAT-DO	None
66–78	Same as Q2–14	
79–81	BRAT-DO	None