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AIRPORT COOPERATIVE RESEARCH PROGRAM

ACRP RESEARCH REPORT 221

**Measuring Quality
of Life in Communities
Surrounding Airports**

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TRANSPORTATION RESEARCH BOARD

2020

AIRPORT COOPERATIVE RESEARCH PROGRAM

Airports are vital national resources. They serve a key role in transportation of people and goods and in regional, national, and international commerce. They are where the nation's aviation system connects with other modes of transportation and where federal responsibility for managing and regulating air traffic operations intersects with the role of state and local governments that own and operate most airports. Research is necessary to solve common operating problems, to adapt appropriate new technologies from other industries, and to introduce innovations into the airport industry. The Airport Cooperative Research Program (ACRP) serves as one of the principal means by which the airport industry can develop innovative near-term solutions to meet demands placed on it.

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(continued on page vi)


FOREWORD

By Joseph D. Navarrete

Staff Officer

Transportation Research Board

ACRP Research Report 221 provides a comprehensive, systematic method for assessing an airport's influence on the quality of life of neighboring communities. Compared to studies limited to discrete impacts (e.g., economic and noise studies), a quality of life assessment provides a more holistic view of the positive and negative impacts resulting from an airport and its activities. The report will be of particular interest to industry practitioners who wish to better understand their airports' impacts on quality of life, take advantage of new tools to interact and build trust with communities, and enhance their planning and support of their airports' long-term goals.

Quality of life is a broad and multidimensional concept that usually includes an individual's perception of his or her position in life and encompasses positive and negative aspects. It includes objective factors—such as health, work status, and living conditions—and the subjective perceptions one may have of these factors within the context of culture, values, and spirituality. Airports may influence quality of life positively (e.g., creating jobs, attracting and supporting business, and serving as hubs for transportation networks) and negatively (e.g., generating noise and affecting air quality). These complexities make measuring the impact of airports on quality of life challenging. Airports often undertake economic and environmental impact studies. But, to date, no guidance on comprehensively measuring the impact of airport-related activity on overall quality of life has been available.

The research, led by Harris Miller Miller & Hanson, Inc., began with a comprehensive literature review to gain an understanding of existing quality of life frameworks and methods, with particular focus on transportation-related factors. The literature review was followed by outreach to industry stakeholders—including airports—that were incorporating aspects of sustainability and social equity into their missions. Based on the information gathered, the team developed a draft quality of life assessment method that was built on industry-accepted standardized tools and practices and that is flexible, adaptable, and scalable to various-sized airports and communities. After testing at several airports and communities, the team completed the final quality of life assessment method. It considers nearly 100 indicators in six high-level categories, including economic, environmental, health, local governance–community services, social relationships, and transportation. Indicators are also identified by the degree to which airports can influence them and whether they can be measured quantitatively or qualitatively.

The guidebook will help readers undertake a quality of life assessment for their unique situation, including engaging with stakeholders, defining the study area, identifying relevant indicators, administering the survey, measuring and weighting data, and reporting and communicating the results. A Quality of Life Assessment Survey Tool, an Indicator Thresholds and Quantitative Data Sources Excel spreadsheet, and a Sample Quality of Life Assessment Introduction PowerPoint are available at www.trb.org by searching for “ACRP Research Report 221.”

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Note: Photographs, figures, and tables in this report may have been converted from color to grayscale for printing. The electronic version of the report (posted on the web at www.trb.org) retains the color versions.

SUMMARY

Measuring Quality of Life in Communities Surrounding Airports

Airports exist to facilitate the safe movement of people and goods while making every effort to do so in a way that minimizes the negative impacts and maximizes the benefits to their surrounding communities. Many airports seek to understand their impacts on neighboring towns, cities, and regions through economic impact analyses, employment studies, and environmental studies, such as those that focus on sustainability efforts or noise. However, there is an emerging need for airports to take a more holistic look at how they affect their neighbors and how they can build stronger community relationships. Airports would also benefit from a more comprehensive understanding of the variables affecting their surrounding communities, over which they may have little to no control.

WHAT IS QUALITY OF LIFE?

Quality of life is a broad, multidimensional concept that refers to an individual's or a community's perception of and actual well-being and position in life. It encompasses many categories of variables, including health, economics, environmental, psychological, and social factors.

For these reasons—among others identified in this guidebook—airports should consider measuring comprehensive quality of life (QOL) in their surrounding communities. QOL is a broad, multidimensional concept that refers to an individual's or a community's perception of and actual well-being and position in life. It often encompasses variables in health, economics, psychological, social, and other categories. Gaining a better understanding of QOL in communities surrounding airports will allow airports to identify challenges and concerns, as well as understand how they can create opportunities to address existing or emerging challenges.

This guidebook provides airports and their communities with the information and tools necessary to understand QOL and how it can be measured in communities surrounding airports. The guidebook provides the process and steps an airport can take to develop its own QOL assessment. While the methodology described in this guidebook is intended to be flexible and customizable to reflect the needs of individual airports, it contains information, tips, and a tiered approach to developing a QOL assessment, including suggestions for determining the study area, the scope of the assessment, and how to score and interpret the results. Background information on similar QOL studies and details of how the Quality of Life Assessment Methodology was developed, in addition to related tools, are available in the appendices to the guidebook.

Guidebook Audience

This guidebook is intended for use by airports of all sizes and types with varying levels of resource availability that are interested in gaining an understanding of QOL of their

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surrounding communities. The guidebook provides direction for conducting a QOL assessment via a tiered approach through which airports and communities accrue benefits from each sequential step. For example, completing the first step of the assessment process will spur internal conversations within the airport about QOL and encourage airport staff to think more broadly about how airport decisions affect surrounding communities. As resources allow, the airport can continue to build on prior steps and work towards developing a full-scale QOL assessment. The target audience for this guidebook includes

- **Airport administrators, executives, and decision makers.** The guidebook provides information necessary to understand the QOL concept and identify how an airport can use a QOL assessment to consider its influence on communities beyond routinely reported impacts (e.g., economic and environmental). It provides discussion of how a QOL assessment can support the broader goals of an airport and its surrounding communities while building trust between the airport and external stakeholders.
- **Airport technical staff, including planners and environmental, sustainability, and operations personnel.** Although airport departments often collaborate, they may also operate in silos as their purpose and goals differ. When operating in silos, there may be a lack of awareness about how the decisions of one department may conflict with the goals of another at some airports. In these cases, a decision made by one department may have less than desirable impacts on the community, and a negative reaction from the community may come as a surprise to other departments. In some cases, negative impacts can be avoided or minimized through improved coordination among internal departments. This guidebook provides the tools necessary to facilitate improved inter-departmental dialogue on issues that affect the surrounding community.
- **Airport communications, public relations, and government–external affairs personnel.** Airport professionals with responsibilities in the communications, public relations, or government–external affairs realms have frequent interactions with individuals and groups affected by airport activities, including the public, passengers, airport tenants, local governments, and elected officials. These airport personnel drive the narrative concerning airport decisions and plans. They may regularly receive and respond to positive and negative feedback from the public. These personnel are integral to any QOL assessment effort an airport chooses to pursue, as they can assist in identifying the critical stakeholders to involve, defining the study area, and communicating the QOL assessment results. Obtaining a more holistic understanding of QOL will enable these professionals to better communicate with airport stakeholders.
- **Municipal governments and agencies (e.g., elected officials, planning departments, and economic development agencies).** Many airports are owned and operated by a city government or an airport authority that closely coordinates with local governments. In some cases, airport authority members are appointed by elected officials. Local governments have an interest in understanding the factors that affect the prosperity, health, and welfare of their citizens for planning purposes and to allocate resources properly to meet long-term goals. Airports are critical components of local economies and regional transportation networks. Not only do they provide local jobs, but they also serve to attract business and tourists to a region. Local governments would benefit from a better understanding of how their local airport(s) may affect QOL and what factors are not affected by the airport. This may allow them to better predict any possible conflicts or controversies before they arise or to help resolve conflicts that do arise.
- **Community organizations, educational institutions, business community, and tourism boards.** Large employers—such as universities, hospitals, and businesses, in addition to other local organizations—have a vested interest in the economic, social, and environmental well-being of the community and its residents (including students, employees, and customers). These organizations may depend on their local airports for

transporting employees, moving cargo and products, drawing regional tourism, and more. But they may not have a clear understanding of how the airports' decisions could affect their organization and stakeholders or where there may be synergistic opportunities for mutual benefit. The Quality of Life Assessment Methodology provides a means by which these organizations can engage in discussions with the airport to exchange information and identify one another's chief concerns, collective challenges, and goals. These discussions provide a means for information and data sharing between parties that are necessary for completing components of the QOL assessment. Inclusivity is critical to the success of a QOL assessment and requires the involvement of external organizations and community stakeholders to provide a range of important perspectives.

- **Residents of communities near airports.** Communities near airports are affected by airport operations in positive and negative ways. For example, living near an airport provides quick access for business and personal travel and allows for proximity to job opportunities at the airport. Conversely, living near an airport may correlate with greater exposure to aircraft noise or increased roadway traffic, which can negatively impact an individual's or community's QOL. If community residents feel that they are bearing a disproportionate burden of the costs of airport operations, the benefits may be obscured by one or two specific impacts. Dialogue between the community and the airport will benefit from consideration of additional elements of QOL. Completion of any assessment process steps will, hopefully, lead to more balanced and holistic perspectives on how local airports affect community QOL.

Organization of the Guidebook

This guidebook is organized into six chapters, a references and bibliography list, an acronyms list, and seven appendices:

Chapter 1. The first chapter provides an overview of the QOL concept, the research approach, the objective of the project, and the rationale for undertaking a QOL assessment at an airport.

Chapter 2. Chapter 2 provides an overview and explanation of the Quality of Life Assessment Methodology, including a description of the quantitative and qualitative indicators, the QOL scoring mechanism, and the process of importance weighting. Additional details on the methodology are provided in Appendix C: Existing Quality of Life Resources.

Chapter 3. This chapter provides step-by-step instructions for developing a QOL assessment using a tiered approach in which airports can gain value from each sequential step.

Chapter 4. Chapter 4 provides detail on how airports can collect data on both quantitative and qualitative indicators as part of the Quality of Life Assessment Methodology.

Chapter 5. This chapter provides information necessary for analyzing the collected QOL data, along with recommendations for visualizing the data and communicating results.

Chapter 6. The conclusion includes a summary of recommendations for further related research.

References and Bibliography. This section consists of a list of the sources used to support the data provided in the guidebook.

Acronyms. This section lists the definitions of acronyms used throughout the guidebook.

Appendix A. Appendix A contains the Quality of Life Assessment Survey Tool. The survey contains participant instructions, all qualitative indicators and importance weighting questions, quantitative indicators and importance weighting questions, and optional demographic questions. The survey is provided as a separate, downloadable Word document so that airports can more easily input the survey questions into their preferred survey administration tool, if desired. The Quality of Life Assessment Survey Tool can be found at www.trb.org by searching for "ACRP Research Report 221."

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Appendix B. Appendix B is a stand-alone, downloadable Excel file containing a list of all QOL indicators, including thresholds and data sources for the quantitative indicators. It also includes instructions for obtaining information related to quantitative indicators. Indicator Thresholds and Quantitative Data Sources can be found at www.trb.org by searching for “ACRP Research Report 221.”

Appendix C. This appendix provides an overview of selected QOL studies and research, some of which provided or influenced the selection of indicators and methodology included in this guidebook. It is not intended to be a comprehensive review of all literature related to QOL, but rather a snapshot of some relevant resources to further acquaint the guidebook user with the topic and how other QOL studies have influenced the material in this guidebook.

Appendix D. Additional information explaining the Quality of Life Assessment Methodology and motivation for the research team’s approach is included in Appendix D.

Appendix E. Summaries of the three partner airport workshops are included in Appendix E. The workshops were conducted with airport and community stakeholders to validate the Quality of Life Assessment Methodology.

Appendix F. Appendix F is a stand-alone, downloadable PowerPoint file that serves as a basic introduction to QOL concepts and the Quality of Life Assessment Methodology itself. Airports can customize these slides to support both internal discussions with airport stakeholders and external discussions with community organizations. The Sample Quality of Life Assessment Introduction PowerPoint can be found at www.trb.org by searching for “ACRP Research Report 221.”

Appendix G. This appendix presents options for visualizing and presenting data collected as part of a QOL assessment to facilitate interpretation and analysis of results for decision-making purposes.

Introduction

Airports serve as critical economic engines for their local communities and in a broader regional context. As employment hubs, airports provide benefits to nearby residents and businesses alike. They provide the connectivity necessary to support regional and global transportation networks and foster economic growth on a wider scale by moving people and goods. Aviation also provides critical infrastructure to facilitate response and recovery during local, regional, or national emergencies. Although airports provide important economic value and societal benefits, their operations may result in some negative social and environmental impacts.

Communities have come to expect transparency from airports with regard to planning and development, and when airport activities are likely to affect them, the public expects opportunities for engagement and to provide input in the planning process (Federal Aviation Administration 2019a). When communities become concerned or preoccupied with the negative effects of airport operations on their neighborhoods and well-being, community actions and public opinion influence the airport's ability to operate efficiently and expand service. Alternatively, when communities are more meaningfully engaged in airport decision-making processes, problems may be mitigated or avoided since subsequent decisions consider community priorities and concerns. Community concerns often focus on environmental impacts, such as increased exposure to noise, traffic, or air pollution. In some cases, communities have advocated closing airports altogether (Weikel and Smith 2017). For their own interests and for the good of their surrounding communities, airports benefit from building and maintaining constructive relationships with stakeholders and neighbors.

Airports in the United States often seek opportunities to engage with their local and regional stakeholders to better understand the social, economic, and environmental impacts of their operations while working to maintain safety, security, capacity, operational efficiency, and financial stability. Many commercial U.S. airports maintain informative public websites and routinely publish economic impact studies, operations statistics, and environmental reports. Sustainability planning is also increasing as airports develop sustainability management plans (SMP) or sustainability master plans (Federal Aviation Administration 2019b).

Although these reports and planning efforts are helpful for communicating with the public and engaging with stakeholders about known sensitivities or activities, airports often encounter challenges in quantifying their economic, social, and environmental benefits and impacts in a comprehensive manner. Emerging issues—such as affordable housing shortages, population growth near airports, and related development—are difficult to understand through conventional airport reporting methods. Obtaining a better understanding of their surrounding communities and individuals' perception of QOL will benefit airport leadership by enabling them to more easily identify challenges and concerns, as well as to understand how the airport can create opportunities to address these challenges.

1.1 Quality of Life Concept

Over the past few decades, QOL reporting tools and related frameworks have been developed to serve diverse purposes across many disciplines to inform decision-making at local, national, and international levels. Examples include the Organisation for Economic Co-operation and Development (OECD) Better Life Initiative, the Sustainability Tools for Assessing and Rating (STAR) communities system, and the U.S. Environmental Protection Agency's (EPA's) Multi-sector Evaluation Tool for identifying Resilience Opportunities (METRO). While some of the existing tools address certain transportation-related components of overall QOL, none were specifically developed to enable airports to assess QOL in their communities in a holistic manner. This guidebook aims to fill that gap by providing a community Quality of Life Assessment Methodology designed uniquely for airports.

The literature review for this study concluded that there is no universally accepted definition of QOL, though many are similar in nature.

This guidebook adopts a definition of QOL like that used by the World Health Organization, which is as follows:

Individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. It is a broad-ranging concept affected in a complex way by the person's physical health, psychological state, level of independence, social relationships, personal beliefs, and their relationship to salient features of their environment (World Health Organization 1997).

For the purposes of this document, QOL is a broad, multidimensional concept that refers to an individual's or community's perception of and actual well-being and position in life, encompassing many categories of variables that include health, economics, environmental, psychological, and social factors.

1.2 Quality of Life and Sustainability

Many airports in the U.S. (and around the world) have integrated sustainability into their planning processes. The traditional definition of sustainability considers the intersection of environment, economics, and social factors, otherwise known as the triple bottom line. The airport industry developed a modified version that includes economic viability, operational efficiency, natural resource conservation, and social responsibility (EONS) (Figure 1).

The Quality of Life Assessment Methodology includes several indicators that may fall into the categories shown in Figure 1, but it also considers indicators that fall under additional categories, such as health and social relationships. Airports that have developed sustainability plans will have experience considering the impacts of their operations outside the physical boundary of the airport and will likely be familiar with some of the QOL indicators discussed in Chapter 2.

QOL concepts also relate to international frameworks and measures of sustainability. In particular, the United Nations (UN) developed 17 Sustainable Development Goals (SDGs) in 2012 as a component of the 2030 Agenda for Sustainable Development (Figure 2). The goals provide a framework for government, civil society, and private industry to address environmental, economic, and political challenges across all UN member states. The goals include ending poverty, hunger, and inequality while increasing access to health care, education, clean water and sanitation, affordable and clean energy, decent work, and economic growth through specific targets and initiatives. Especially relevant to the aviation industry are the SDGs related to improving industry, innovation, and infrastructure, in addition to



Figure 1. Airport industry definition of sustainability.

promoting sustainable cities and communities, responsible consumption and production, and climate action.

The International Civil Aviation Organization’s (ICAO) strategic objectives share strong links to many of the SDGs, ensuring support for member states to meet related targets (ICAO 2019). The Air Transport Action Group (ATAG) found that the aviation industry plays an important role in supporting 15 of the 17 SDGs. ATAG provides guidance for industry stakeholders to contribute toward accomplishing these goals and identifies the relevance of each goal to the industry in their 2017 *Flying in Formation* report (ATAG 2017). Some U.S. airports, such as Dallas–Fort Worth International and San Francisco International, are actively using the SDGs



Figure 2. UN Sustainable Development Goals (Source: United Nations, <https://www.un.org/sustainabledevelopment/>).

to guide their sustainability strategies and goals. Many SDG targets closely align with the QOL indicators included in this guidebook. The Quality of Life Assessment Methodology presented in this guidebook serves as an additional tool for airports to gain a better understanding of baseline conditions and how these may tie into SDGs.

1.3 Role of Airports

By evaluating the diverse components that comprise total QOL in their surrounding communities and how to measure them, airport leaders will better understand how community QOL is affected by factors the airport directly controls, factors that the airport doesn't control but may influence, and factors over which the airport has little to no control or influence. By engaging a broad group of stakeholders and including as many community perspectives as feasible (particularly those that may not already be captured by other engagement efforts), airports will have access to more data sources that demonstrate airport activities' benefits to surrounding communities, as well as data sources that enhance the airport's awareness and consideration of negative effects on their neighbors. Inclusivity is key to ensuring that the assessment will provide airport leaders with information that will encourage them to think more holistically about their influence and be better informed about community priorities that may influence the airport's current decision making, long-term planning, and relationships with the community. Building relationships is an important benefit of the QOL assessment process.

Airport leaders and federal regulators strive to ensure the safety, capacity, and security of airports while minimizing environmental impacts. Often, airport decisions have positive and negative effects on communities, requiring decision makers to carefully consider all impacts before making a final decision. For example, the Federal Aviation Administration's (FAA's) implementation of Performance-Based Navigation (PBN) procedures and other technology changes through the Next Generation Air Transportation System (NextGen) airspace modernization program have led to some unanticipated effects. The NextGen program intends to improve the capacity, performance, efficiency, and predictability of the National Airspace System (NAS) through upgraded technology, navigation, and communications systems. While the implementation of new air traffic procedures such as PBN can improve efficiency and safety, it also results in aircraft flying more precise routes over narrow corridors. Residents that live underneath new PBN flight paths will experience a higher frequency of overflight as well as increased—and perceived increases in—noise exposure, which can negatively affect QOL. NextGen implementation serves as an example of how one indicator (i.e., noise exposure) can affect the QOL of residents and, thus, change how airport communities perceive the airport and its effect on their environment.

As such, the RTCA PBN Blueprint Community Outreach Task Force determined that it is essential that “proposed PBN implementations should include the populations and political jurisdictions affected by anticipated changes in flight track centerline locations (both lateral and altitude changes), aircraft dispersion around the centerlines, and anticipated changes in runway use at the affected airports.” Failure to do so “can delay/derail PBN projects whether or not federal standards are exceeded” (RTCA 2016). The Quality of Life Assessment Methodology ensures that a proactive approach to community engagement is conducted, which assures project success while maintaining community QOL.

As new programs arise and technologies for managing airports evolve, airport leaders will find value in obtaining a baseline of community QOL to better anticipate responses from the community when changes occur. A QOL assessment will provide an airport with a snapshot of community QOL at a specific point in time, which will allow the airport and other stakeholders to track changes over time. Once established, the assessment process is intended to be

easily replicable, allowing the airport to perform periodic assessments and adjust planning and public outreach when possible, based on changes in QOL assessment results.

1.4 Purpose and Objective of the Guidebook

Many airports routinely study their impacts on certain components of QOL—such as contributions to the local and regional economy—or environmental impacts, such as noise exposure. However, there is no existing guidance for airports, communities, and other stakeholders to discuss or assess overall QOL and how it may be affected by airport-related activity. The objective of this research is to provide airports with a tool to better understand their impacts on the QOL of surrounding communities, which can, in turn, inform planning processes and stakeholder engagement activities.

At many airports, diverse airport departments—such as external or government relations, human resources, communications, operations, planning, environmental, commercial development, and concessions—collect and manage data related to their respective departmental objectives and related community involvement efforts. Although each department has unique expertise, it can be challenging or impractical to combine the results of multiple studies—conducted over varying timelines in support of differing goals—into a cohesive analysis for decision-making purposes.

For example, the Sustainable Aviation Guidance Alliance database contains almost 1,000 examples of initiatives that airports have employed to improve their economic performance, increase operational efficiency, conserve natural resources, and provide a positive social impact. These examples highlight the diversity of the influences that airports have on local communities and the complex issues that airport managers work to address.

The Quality of Life Assessment Methodology provides a flexible framework for airports—or any organization that uses the assessment methodology—to collect data for 100 suggested indicators that span six categories of QOL and collectively contribute to overall QOL. The categories include Environmental, Health, Economic, Transportation, Social Relationships, and Local Governance–Community Services (Figure 3). Not all of the indicators are affected by airport operations, but they are included so that the baseline data represent all factors contributing to—or detracting from—a community’s overall QOL.

Even if an airport does not appear to influence a particular indicator, future conditions may change and airport activities may at that point begin to influence the indicator. Indicators include some airport-related items such as intensity of aircraft noise annoyance, but the majority are not specific to an airport. Examples include access to health care, job satisfaction, satisfaction with public transportation, feeling of belonging to a community, and community safety.

This guidebook is intended to bring together airport staff from diverse departments and facilitate engagement with external organizations and community members to increase the airport’s ability to understand community needs and perspectives. The research team’s mixed-methods approach—integrating both quantitative and qualitative data—intends to improve an airport’s understanding of its broad influence on local communities. These insights may illuminate interrelationships among airport decisions and community QOL, or they may demonstrate that certain aspects of QOL are completely independent of airport operations. The

WHY UNDERTAKE A QOL ASSESSMENT?

- Build awareness within the airport of the interrelationships between airport decisions and community QOL.
- Provide new tools to interact with the community and build trust.
- Enhance planning and support the airport’s long-term goals.



Figure 3. QOL indicator categories. Note: The Quality of Life Assessment Methodology includes 100 indicators, 99 of which are in the six categories represented in this figure. The 100th indicator concerns overall QOL and is not included under a specific category.

resulting conversations are intended to assist the airport in understanding trends, anticipating community needs and concerns, and improving overall perceptions of the airport. Improved understanding supports airport managers and other leaders in making decisions that are beneficial to local QOL.

Many of the anticipated benefits of a QOL study are similar to those described in *ACRP Report 20: Strategic Planning in the Airport Industry* (Ricondo & Associates et al. 2009), which includes the following organizational benefits to the airport (summarized):

- Increasing efficiency through the development of performance metrics;
- Developing processes or frameworks to help prioritize projects; and
- Facilitating airport decision makers to comprehensively review “bold initiatives, strategies, and alternatives more easily than during the master planning process.”

Community benefits include:

- Assisting the airport “to build community support and explain to elected officials how the airport contributes to the community’s economic development”;
- Serving as a tool for obtaining feedback from key stakeholders; and
- Minimizing future conflicts by building consensus for future airport needs that must be supported by decisions in the present or near term.

The Quality of Life Assessment Methodology is intended to be flexible. As described in Chapter 3, the methodology is presented in a series of steps, which enable the airport to study

QOL progressively, depending on the airport's goals and available resources. QOL assessments will be custom for each airport and its identified assessment study area, reflecting the unique characteristics of a specific community. The results of one airport's QOL assessment cannot be compared to the results from any other airport's assessment. The Quality of Life Assessment Methodology will allow individual airports to compare their results over time from their baseline year (when the initial assessment was completed).

1.5 Research Approach

Development of the Quality of Life Assessment Methodology included a literature review, development of draft QOL indicators, categorization of the indicators, development of the survey instrument, identification of sources and thresholds for quantitative data collection, and collaboration with three partner airports and their community stakeholders to refine the proposed methodology. The research did not include administration of a full QOL assessment for any of the three partner airports.

The research team conducted a comprehensive literature review to gain an understanding of existing QOL frameworks and methodologies. Appendix C provides an overview of selected QOL studies. The summaries provide a small sample of the QOL assessment resources that were consulted to develop the guidebook, including both QOL studies that are more general and those specific to transportation and aviation. Appendix C is not intended to be a comprehensive review of all literature related to QOL, but rather a snapshot of relevant resources to further acquaint the guidebook user with the topic and provide background material for context.

The literature review allowed the research team to identify a draft list of QOL indicators. The research team then sorted the list of indicators into high-level categories and narrowed the list to remove repetitiveness. The resulting indicators reflect a broad range of elements that comprise total QOL and are organized into six categories: Environmental, Health, Economic, Transportation, Social Relationships, and Local Governance–Community Services.

Existing data sets tend to be insufficient in capturing complete information on the myriad of factors affecting QOL. To capture data related to all selected indicators, the research team selected a mixed-methods approach to QOL assessment. The mixed-methods approach uses quantitative and qualitative data to measure QOL, ensuring that the QOL assessment is as comprehensive as possible. Quantitative indicators rely on data from publicly available data sets, such as U.S. Census Bureau data. Qualitative data require gathering input directly from community members, in this case through administering a survey in which each indicator is framed as a multiple-choice question. The survey portion of the Quality of Life Assessment Methodology is intended to capture information directly from community residents concerning their subjective experiences, opinions, and perceptions. The Quality of Life Assessment Methodology is described in greater detail in Chapter 2, and the data collection process is discussed in Chapter 4. The Quality of Life Assessment Survey instrument is found at www.trb.org by searching for “ACRP Research Report 221.” Additional explanation of the Quality of Life Assessment Methodology and motivation for the research team's QOL assessment approach is included in Appendix D.

The selected indicators are not expected to be of equal importance to an individual's or a community's overall QOL. Thus, the Quality of Life Assessment Methodology includes a process for weighting the contribution of each indicator to overall QOL. Weighting the indicators will provide greater insight into which indicators are most important to specific communities and will allow the airport to prioritize discussion and consideration of issues the community weights as most important.

12 Measuring Quality of Life in Communities Surrounding Airports

To refine the Quality of Life Assessment Methodology, the research team worked with three volunteer partner airports. The methodology was reviewed during teleconferences, webinars, and in-person workshops with the partner airports—Dallas–Fort Worth International in Texas, Tampa International in Florida, and Portland International Jetport in Maine—and their internal and external stakeholders. Feedback received from the airports and community stakeholders was incorporated into a refined methodology. Once the methodology was revised, the Quality of Life Assessment Survey was further tested by 32 members of the research team living within the service area of a large international airport, and quantitative data from publicly available data sets covering the same spatial area were gathered. The results from this survey were used to visualize data for purposes of this guidebook. The sample survey was administered only to generate data to facilitate portions of this guidebook and is not a representative sample.

Quality of Life Methodology

By understanding the factors that positively or negatively affect QOL, airports can gain insight into how their operations and decisions affect surrounding communities. This project provides a framework to help airports and communities measure and track QOL for a baseline year and over time. The Quality of Life Assessment Methodology developed for this guidebook was based on existing QOL studies and on a similar tool developed by Eastern Research Group (ERG) and EPA for evaluating resilience of communities to the impacts of climate change, as developed by Blue, Hiremath, Gillette, and Julius (2017). The EPA tool is known as the Multisector Evaluation Tool for identifying Resilience Opportunities, or METRO.

Some factors affecting QOL in a community—such as economic health, air quality, and water quality—can be measured quantitatively through publicly available datasets. Other factors are not reflected in this type of available data. These are best addressed by asking community members for their input, including the factor’s relative importance and how it currently affects their QOL. As described in Section 1.5, the research team selected a mixed-methods approach to assessing QOL, incorporating hard data (when available) and qualitative information collected from community members to address QOL comprehensively.

A QOL assessment approach that integrates both quantitative and qualitative information increases understanding of the broad influence that airports have on local communities and can eventually support airport leadership in making decisions that are beneficial to local QOL. Perhaps even more importantly, involvement in assessing the QOL of the local community demonstrates to communities that the airport is aware of and considerate of its effects on its neighbors. This can help foster improved relationships between airports and communities.

2.1 Quantitative and Qualitative Indicators

The list of 100 indicators for evaluating QOL is a mix of quantitative and qualitative indicators (Table 1). For the quantitative indicators, existing data sets are used to score QOL (suggested data sources for each quantitative indicator are provided in the Indicator Thresholds and Quantitative Data Sources, found at www.trb.org by searching for “ACRP Research Report 221”). For the qualitative indicators, the assessment methodology includes the Quality of Life Assessment Survey Tool, also found at www.trb.org. The survey contains a question for each qualitative indicator. Survey respondents must answer multiple choice questions, and the answer choice corresponds to a QOL score from 1 to 4 (low to high QOL represented by each indicator); therefore, providing a rough quantitative score for the qualitative information collected. In addition, survey respondents are asked to rate how important each indicator is to their overall QOL. This “importance score” is then used to weight the importance of that indicator to the overall assessment, as discussed further in Section 2.4.

Table 1. Quality of life indicators.

Indicator ID	Type	GENERAL
O1	Qualitative	Overall quality of life
Indicator ID	Type	ENVIRONMENTAL
EN1	Qualitative	Satisfaction with local air and water quality
EN2	Qualitative	Quality of parks and natural spaces
EN3	Qualitative	Frequency of visiting parks and natural spaces
EN4	Qualitative	Local aesthetics
EN5	Qualitative	Water quantity
EN6	Qualitative	Satisfaction with housing
EN7	Qualitative	Convenience to amenities
EN8	Qualitative	Light pollution
EN9	Qualitative	Satisfaction with the environmental stewardship of nearest airport
EN10	Qualitative	Intensity of aircraft noise annoyance
EN11	Qualitative	Environmental justice
EN12	Quantitative	Outdoor air quality
EN13	Quantitative	Amount of public parklands
EN14	Quantitative	Amount of protected areas
Indicator ID	Type	HEALTH
H1	Qualitative	Satisfaction with health
H2	Qualitative	Physical health status
H3	Qualitative	Mental health status
H4	Qualitative	Impact of health on ability to perform daily activities
H5	Qualitative	Exercise frequency
H6	Qualitative	Diet
H7	Qualitative	Level of stress
H8	Qualitative	Meaning and purpose in life
H9	Qualitative	Self-esteem
H10	Qualitative	Hope and optimism
H11	Qualitative	Recent happiness
H12	Qualitative	Screen use
H13	Qualitative	Access to health care
H14	Qualitative	Access to recreation facilities (indoor or outdoor)
H15	Qualitative	Ability to obtain fruits and vegetables
H16	Qualitative	Ability to concentrate (in relation to noise-related disturbances)
H17	Qualitative	Sleep disturbances
H18	Qualitative	Indoor heating and cooling comfort
H19	Quantitative	Workplace safety
H20	Quantitative	Asthma prevalence
H21	Quantitative	Obesity prevalence
H22	Quantitative	Percentage of population with disabilities

Table 1. (Continued).

Indicator ID	Type	ECONOMIC
E1	Qualitative	Household disposable income
E2	Qualitative	Ability of household income to meet the basic needs of the household
E3	Qualitative	Ability to afford unexpected expenses
E4	Qualitative	Comparative income
E5	Qualitative	Access to financial resources
E6	Qualitative	Housing affordability
E7	Qualitative	Health care affordability
E8	Qualitative	Access to affordable child care
E9	Qualitative	Job satisfaction
E10	Qualitative	Job security
E11	Qualitative	Time at work
E12	Qualitative	Work–leisure balance
E13	Qualitative	Opportunities for advancement
E14	Qualitative	Opportunities for acquiring new information and skills
E15	Quantitative	Household income
E16	Quantitative	Job opportunities
E17	Quantitative	Economic growth
E18	Quantitative	Unemployment rate
E19	Quantitative	Percentage of people living below poverty line
E20	Quantitative	Housing affordability
E21	Quantitative	Homelessness
E22	Quantitative	Gender gap
E23	Quantitative	Percentage of high school graduates
Indicator ID	Type	TRANSPORTATION
T1	Qualitative	Traffic congestion
T2	Qualitative	Access to transportation
T3	Qualitative	Satisfaction with public transportation
T4	Qualitative	Transportation system redundancy
T5	Qualitative	Maintenance of transportation infrastructure
T6	Qualitative	Bicycle and pedestrian routes
T7	Qualitative	Access to transportation by vulnerable populations
T8	Qualitative	Satisfaction with nearest airport
T9	Quantitative	Traffic congestion
T10	Quantitative	Active transportation for commuting
T11	Quantitative	Public transportation for commuting
T12	Quantitative	Vehicle safety
Indicator ID	Type	SOCIAL RELATIONSHIPS
S1	Qualitative	Feeling of belonging to community
S2	Qualitative	Social connectedness
S3	Qualitative	Connection with neighbors
S4	Qualitative	Satisfaction with community events
S5	Qualitative	Time off work (e.g., weekends and vacations)
S6	Qualitative	Volunteerism
S7	Qualitative	Acts of service or assistance
S8	Qualitative	Religious or spiritual engagement
S9	Qualitative	Feeling that most people are trustworthy
S10	Qualitative	Resolution of conflicts with others
S11	Qualitative	Experience of discrimination

(continued on next page)

Table 1. (Continued).

Indicator ID	Type	LOCAL GOVERNANCE–COMMUNITY SERVICES
G1	Qualitative	Satisfaction with public services
G2	Qualitative	Access to local services
G3	Qualitative	Equitable access to local services
G4	Qualitative	Quality of public education system
G5	Qualitative	Community safety
G6	Qualitative	Emergency notification system(s)
G7	Qualitative	Waste diversion
G8	Qualitative	Availability of services for disabled persons
G9	Qualitative	Community resilience
G10	Qualitative	Perception that your input matters in government
G11	Qualitative	Trust in public officials
G12	Qualitative	Local commitment to long-term planning
G13	Qualitative	Consideration of vulnerable populations
G14	Qualitative	Support available to caregivers
<i>G15</i>	<i>Quantitative</i>	<i>Emergency medical service response time</i>
<i>G16</i>	<i>Quantitative</i>	<i>Violent crime</i>
<i>G17</i>	<i>Quantitative</i>	<i>Voter turnout</i>

Note: Shaded and italicized indicators represent quantitative indicators, which can be assessed through the collection and analysis of publicly available data (described further in Chapter 3 and in Appendix B: Indicator Thresholds and Quantitative Data Sources, found at www.trb.org by searching for “ACRP Research Report 221”).

2.2 Selection of Indicators

Although airport personnel are the intended audience for this guidebook and the accompanying tools, the Quality of Life Assessment Methodology is robust and flexible enough that it can also be implemented by community organizations—such as chambers of commerce or tourism agencies—either to support the airport’s interest in the assessment or for their own assessment purposes. Each of the 100 indicators in the Quality of Life Assessment Methodology has been slotted into one of the six categories introduced in Section 1.4 and in Figure 3.

The quantitative indicators represent a minority of the indicators selected because many QOL components are not reflected in data sets that would generally be available in communities surrounding airports (or any community, for that matter). As a result, most of the indicators are qualitative.

The qualitative indicators are framed as questions in the survey tool (which is a key element of the methodology). If the airport chooses to administer the survey to community residents, there is some subjectivity expected in the answers to be provided during the assessment. The information that community members have about what influences their own QOL is better captured by using a full range of qualitative indicators than by limiting the assessment to information that could be gleaned from the narrower set of relevant quantitative indicators. The Indicator Thresholds and Quantitative Data Sources at www.trb.org and in Table 1 present the full list of quantitative and qualitative indicators included in the Quality of Life Assessment Methodology. Information on how data can be gathered for these indicators is described in Chapter 4.

2.2.1 Supplemental Indicators

The Quality of Life Assessment Methodology is designed to provide flexibility to meet the needs of unique airports. Collecting data for all 100 indicators is suggested under the Quality of Life Assessment Methodology (described in Chapter 3) to ensure a comprehensive study of QOL. The methodology allows the list of indicators to be altered by individual airports to best meet their needs when designing and completing the assessment process, allowing for flexibility. The primary set of 100 indicators was developed based on input from subject matter experts, airport personnel, the ACRP project panel (an advisory panel of technical industry experts), and community stakeholders at three partner airports. However, local conditions vary from airport to airport, and the airport or stakeholders may identify the possibility of significant information gaps using only the provided list of indicators. In these cases, the airport can add or substitute some customized, supplemental indicators to make the QOL assessment more locally relevant, as shown in Table 2.

The Indicator Thresholds and Quantitative Data Sources tool at www.trb.org includes example supplemental indicators that can be added to the Quality of Life Assessment Survey Tool. They can also be used to replace indicators already in the survey tool, for example, if the data does not exist for a certain quantitative indicator or if an existing indicator is not applicable to a certain airport. Airports are free to develop additional qualitative or quantitative indicators to address specific issues of importance to them or their stakeholders.

Too many custom supplemental indicators may jeopardize the ability of a QOL assessment to capture information under the six categories of QOL, as identified by the research team and validated through the research process. Thus, the research team recommends that supplemental indicators be used sparingly unless an airport's situation diverges significantly from those of

Table 2. Example supplemental indicators.

Indicator ID	Type	ENVIRONMENTAL
XX	Qualitative	Access to parks and natural spaces
XX	Quantitative	Drought potential
XX	Quantitative	Watershed quality
Indicator ID	Type	HEALTH
XX	Qualitative	Frequency of moments of extreme happiness
XX	Qualitative	Spirituality or faith (as related to health)
Indicator ID	Type	TRANSPORTATION
XX	Qualitative	Quality of transportation infrastructure
XX	Qualitative	Transparency in airport planning
Indicator ID	Type	LOCAL GOVERNANCE–COMMUNITY SERVICES
XX	Qualitative	Stormwater runoff infrastructure capacity
XX	Qualitative	Condition of existing public infrastructure
XX	Qualitative	Trust in law enforcement
XX	Qualitative	Trust in legal system

Note: XX = the indicator ID number assigned by the user. It should begin with an “S” to designate it as “supplemental,” then the letter of the appropriate category, and followed by a number starting with “1”. For example, if an airport develops two supplemental Environmental indicators for its QOL assessment, it would be given the indicator numbers S-EN1 and S-EN2. If the airport also develops one supplemental Health indicator and one supplemental Transportation indicator, it would receive identification numbers S-H1 and S-T1, respectively.

most U.S. airports. The research team also advises that the original list of 100 indicators be used without making any modifications. However, either approach will lead to a valuable assessment of community QOL to inform future decision making and improve understanding between the airport and the surrounding community.

2.3 Indicator Quality of Life Scoring Mechanism

Each of the 100 qualitative and quantitative indicators shown in Table 1 can be assigned a score from 1 to 4 representing low to high QOL. Each quantitative indicator is assigned a QOL score based on a set of threshold values (determined based on national data sets and described further in Chapter 4). Each qualitative indicator is assigned a QOL score based on participants' responses to the survey questions. These scores are used in a QOL assessment to map collected data for each indicator onto the same scale. Indicators that receive a QOL score of 1 are associated with low QOL for that indicator (in the context of the specific community being evaluated), while a score of 3 or 4 indicates a high QOL for that indicator.

2.3.1 Scoring Quantitative Indicators

For each of the quantitative indicators presented in Table 1, publicly available data were combined with findings from the literature to determine three indicator value thresholds representing points at which the result changes from representing low QOL (an indicator score of 1) to a fair QOL (an indicator score of 2), from fair QOL (an indicator score of 2) to improved QOL (an indicator score of 3), and from improved QOL (an indicator score of 3) to a high QOL (an indicator score equal to 4). The three threshold values defined for each indicator create the upper and lower boundaries used to assign QOL scores of 1, 2, 3, and 4 to data results.

As an example, consider a scenario in which data were collected from the U.S. Census Bureau for Indicator E19 (i.e., the percentage of people living below the poverty line). For this indicator, QOL scores would be assigned using the indicator's unique thresholds as follows:

- A QOL score of 1 would be assigned to a community where 20 percent or more of the population lives below the poverty line,
- A QOL score of 2 would be assigned to a community where 16 percent to less than 20 percent of the population lives below the poverty line,
- A QOL score of 3 would be assigned to a community where 12 percent to less than 16 percent of the population lives below the poverty line, and
- A QOL score of 4 would be assigned to a community where less than 12 percent of the population lives below the poverty line.

Section 4.1 provides additional instructions for gathering quantitative data and assigning QOL scores. The Indicator Thresholds and Quantitative Data Sources at www.trb.org provides a list of the quantitative indicators, the thresholds, and data sources, along with instructions for obtaining information from the identified data sources. Details on how thresholds were derived are included in Appendix D: Process for Developing Quality of Life Assessment Methodology.

2.3.2 Scoring Qualitative Indicators

Qualitative indicators—as listed in Table 1—are represented by a question in the QOL Assessment Survey Tool, including a defined set of four response options. QOL scores ranging from 1 to 4 are assigned to each pre-set response to the questions included in the survey tool. For example, Indicator EN1 (satisfaction with local air and water quality) asks an individual to respond to “How satisfied are you with air and water quality in your community?” by selecting

one of the following responses: “dissatisfied,” “somewhat dissatisfied,” “somewhat satisfied,” or “satisfied.” In this case, QOL scores would be assigned as follows:

- A QOL score of 1 is assigned for a response of “dissatisfied,”
- A QOL score of 2 is assigned for a response of “somewhat dissatisfied,”
- A QOL score of 3 is assigned for a response of “somewhat satisfied,” and
- A QOL score of 4 is assigned for a response of “satisfied.”

Additional instructions for how to gather qualitative data and assign QOL scores are provided in Section 4.2, and a complete list of the qualitative indicator questions and responses is included in Appendix A: Quality of Life Assessment Survey Tool.

2.4 Indicator Weighting Mechanism

An important part of the Quality of Life Assessment Methodology includes prioritizing which indicators contribute the most to QOL or detract the most from QOL. As noted above, for each of the 100 indicators, the QOL score shows how an individual community member is faring—or, collectively, how the community is faring—with relation to the component represented by that QOL indicator (e.g., high QOL is represented by a score equal to 4, and a low QOL is represented by a score equal to 1 for the specific indicator). However, the importance of each indicator will likely vary across communities, so it is not advisable to weight each indicator equally in the assessment. Some indicators may be very important to overall QOL, and some indicators may be minor with regard to how they affect overall QOL for an individual (regardless of whether the QOL score is high or low for that indicator). For this reason, the methodology uses the calculation of “importance scores” to reflect the degree to which an indicator contributes to overall QOL so that each indicator is not weighted equally.

Importance scores vary from 1 to 4. For example, an importance score of 1 represents low importance for an indicator with respect to a respondent’s overall QOL, and a 4 represents high importance. Importance scores for each indicator are captured using the Quality of Life Assessment Survey Tool. For example, the research team anticipates that many participants may rank Indicator H1 (personal satisfaction with health) with an importance score of 4 (high importance), since it is universally applicable and poor health has the ability to affect most aspects of an individual’s life. In contrast, an indicator such as T4 (transportation system redundancy), may receive a lower importance score as it is not universally applicable. Some participants may believe low redundancy in the public transportation system is unlikely to affect their QOL significantly if they have access to a reliable personal vehicle. Other individuals may rank Indicator T4 with a higher importance score if they are dependent on public transportation for commuting to work or school or if they live in areas where the transportation system is unreliable due to scheduling, weather, or recurring maintenance problems.



CHAPTER 3

Conducting a Quality of Life Assessment

This chapter describes the step-by-step tiered approach to conducting a QOL assessment and use of the survey tool, as outlined in Figure 4. The research team recommends that each airport review the steps in this chapter to determine the appropriate number of steps necessary to meet their objectives. This determination may be dependent on preferred assessment timeline, available staff resources, and level of effort needed to support leadership decision making. Airports can gain value from completing Step 1 independently, completing Steps 1 and 2, or conducting a full assessment (completing Steps 1 through 5). Step 6 is optional and can be decided upon at any point in the process, or the airport can revisit the value of Step 6 in the future or as resources permit. Benefits accrue throughout the stepwise process in which airports have the flexibility to work toward a full QOL assessment and subsequent future assessments that offer them the greatest potential benefits. Anticipated benefits include increased coordination and collaboration among airport departments, with airport stakeholders, and with surrounding communities.

The steps of the assessment process include:

1. Initiate QOL dialogue internally.
2. Engage external stakeholders.
3. Determine study area, and gather quantitative data.
4. Administer survey.
5. Analyze data.
6. Review or update assessment at a future date.

Step 1. Initiate Quality of Life Dialogue Internally

The first step in the QOL assessment process involves engaging internal airport stakeholders. Because the process is likely to be new for many internal airport stakeholders, it will require time and discussion for them to become comfortable with the general topic, define the goals of the study, and determine the number of assessment steps to undertake. This step provides an opportunity to set expectations and build support across the organization by educating internal airport stakeholders about the benefits of undertaking a QOL study. The airport can derive value from this step by increasing awareness about the types of impacts airport decisions may have on community QOL. This benefit can be realized even if the airport is not able to pursue a full QOL assessment.

Step 1.1. Identify Lead Individual or Department

Undertaking a QOL assessment requires identification of a leader to coordinate activities, initiate communication and meetings, define the scope of the study, and manage the ongoing

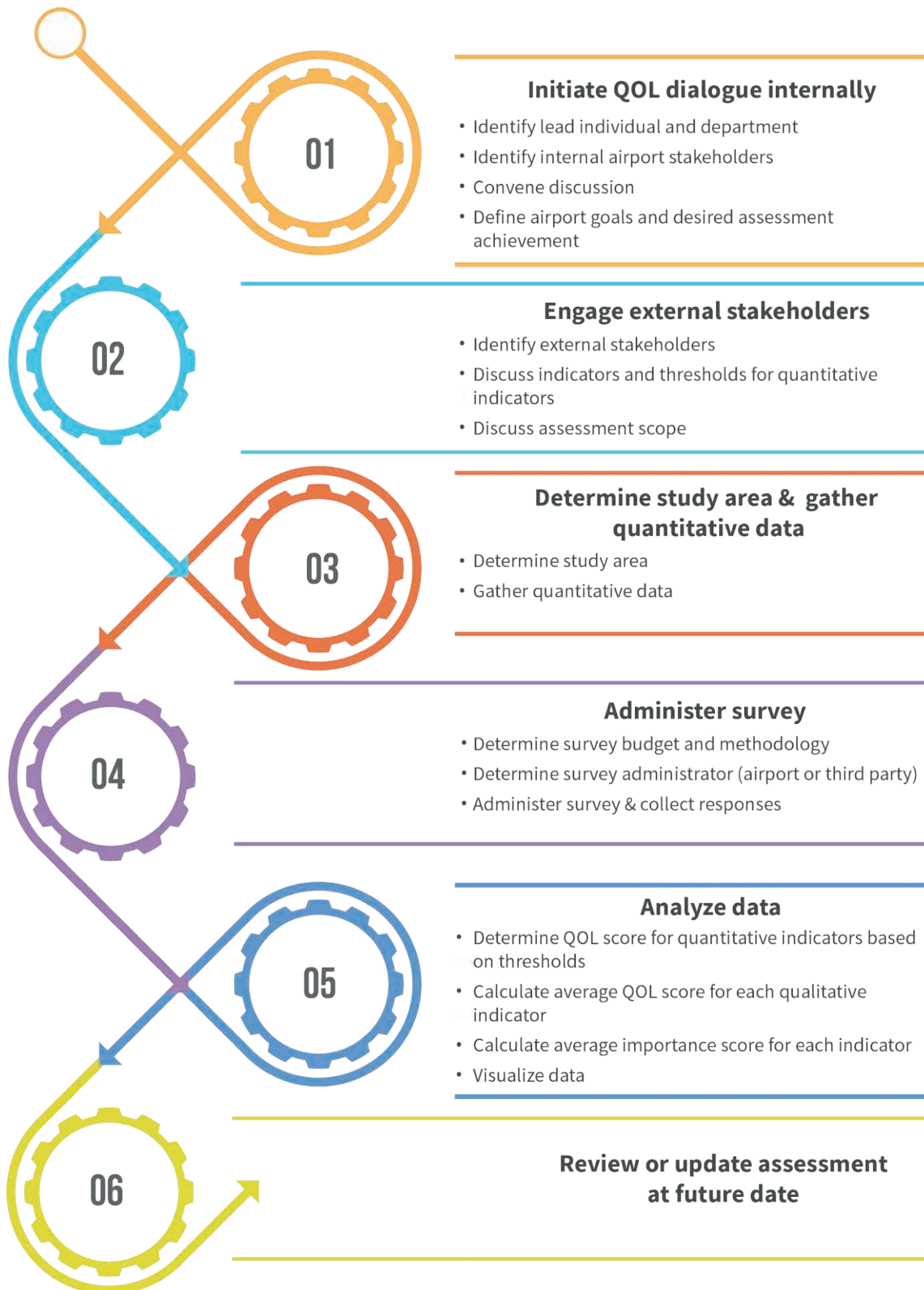


Figure 4. QOL assessment development process.

project. The lead individual or department should be identified early in the assessment process. Not all the decisions regarding the QOL assessment will be made by the lead individual or department, but this person or group will be responsible for many key components of the assessment implementation and should, therefore, have enough resources allocated (e.g., staff, interest, and time).

Step 1.2. Identify Internal Airport Stakeholders

The lead individual or department should then identify a group of diverse internal airport stakeholders to engage in the assessment. These individuals will form the core decision-making team and should, ideally, represent a range of views and various departments at the airport. This approach mirrors that taken by many airports in sustainability planning. Because the Quality of Life Assessment Methodology covers a wide range of topics and involves engagement with external organizations and community members, the following is a list of airport stakeholders that should be considered for involvement:

- Airport executive management (C Suite),
- External or governmental affairs (staff who manage relationships with federal, state, and local governments; and airport commissioners–airport authority board members),
- Communications or public relations,
- Planning,
- Environmental and sustainability,
- Noise (if considered separate from the environmental and sustainability team),
- Capital development,
- Operations,
- Emergency management,
- Airline and tenant relations, and
- Finance–procurement.

Step 1.3. Convene Initial Discussion

Once internal stakeholders are identified, the lead individual or department should begin by convening an initial discussion. This discussion should introduce the concept of QOL, identify the reasons for initiating an assessment, and build support for the initiative. This discussion may take the form of a kickoff meeting—or a series of meetings—with the entire group of internal stakeholders and subsequent conversations between the lead individual or department and smaller groups of internal stakeholders. A sample presentation has been prepared in Appendix F to facilitate the discussion.

Step 1.4. Define Airport Goals and Desired Assessment Achievement

The core decision-making team should determine the airport's goals for undertaking a QOL assessment, ascertain potential available resources, and make an initial determination on the level of achievement sought (i.e., the intended number of assessment steps to complete). An initial discussion about the physical boundaries of the area to be assessed should also occur under this step, although it can be adjusted and finalized in Steps 2 and 3.

Step 2. Engage Key External Stakeholder Organizations

Step 2.1. Identify External Stakeholders

When determining which organizations and groups to include in the QOL assessment, the airport should consider which external stakeholders are most representative of the

communities being assessed. The QOL assessment process establishes a framework for two-way communication between an airport and its stakeholders, subsequently increasing transparency and improving relationships. These relationships help to build trust and understanding between all parties.

The Global Reporting Initiative standards define stakeholders as those who can “reasonably be expected to be significantly affected by the reporting organization’s activities, products, or services; or whose actions can reasonably be expected to affect the ability of the organization to implement its strategies or achieve its objectives. This includes, but is not limited to, entities or individuals whose rights under law or international conventions provide them with legitimate claims vis-à-vis the organization. Stakeholders can include employees and other workers, shareholders, suppliers, vulnerable groups, local communities, and NGOs or other civil society organizations, among others” (Global Sustainability Standards Board 2016).

Airports should first consider existing processes for identifying and engaging with stakeholders, especially if there are preexisting community advisory committees or organizations that the airport has previously consulted with. This may include groups engaged for recent environmental reviews for development projects or master plans. When identifying stakeholders, ensuring a diversity of perspectives is critical as this group will serve as an advisor to the airport on the QOL initiative. Convening a group representative of the local community will improve external stakeholder buy-in to the QOL assessment process by giving many groups a seat at the table. Table 3 presents a list of potential external stakeholders to consider engaging in this step.

Table 3. Potential external stakeholders for consideration.

Stakeholder Groups	Examples
Airport tenants	Airport tenants may include airlines, concessionaires, service providers, tenant employees, and so on.
Residents and communities	Local airport residents Neighborhood groups—community associations Existing airport advisory groups—roundtables
Government organizations and elected officials	Local governments and regulatory agencies Metropolitan planning organizations Municipal and county planning departments Local transportation or transit agencies Economic development authorities Military School districts—school boards Tribal entities FAA Law enforcement—first responders
Public interest groups—nongovernmental organizations	Environmental advocacy groups Quiet Skies groups Historic district associations and historical societies Community groups or local chapters of national advocacy organizations Academic institutions Hospitals
Business interest groups	Local businesses that depend on the airport Chambers of commerce Business improvement districts Convention and visitors’ bureau Developers Trade associations Realtors Unions

Examples of stakeholders identified for each of the three airport partner workshops are provided in Appendix E. The selection of stakeholders may have differed if the partner airports planned to undertake a full QOL assessment, but the identification process aligned with the process used by the airports to identify stakeholders for other purposes, such as master planning or communicating information concerning noise.

Step 2.2. Discuss Indicators and Thresholds for Quantitative Indicators

Once participants have been introduced to the QOL topic, the QOL assessment leader should then walk through all the indicators with the entire group to determine if any gaps exist that may warrant the potential use of supplemental indicators. The group should also discuss whether any quantitative indicator thresholds should be adjusted to reflect local conditions. Although the methodology includes pre-set (default) thresholds for quantitative indicators, airports and their stakeholders may choose to set thresholds more reflective of local conditions or utilizing local data sources. For example, according to the U.S. Department of Housing and Urban Development (2019), the threshold for consideration of a family of four as “low income” in the San Francisco Bay Area (to qualify for certain housing assistance programs), is \$117,400 per year. Default thresholds for Indicator E1 (household income) are based on median U.S. city household income levels as derived from the U.S. Census Bureau. Therefore, an airport located in the Bay Area may choose to realign the income thresholds to better reflect local conditions. In this example, an airport could decide to set the thresholds for the study area to

- An annual income that is below 25 percent of the regional average (which would be associated with a QOL score of 1),
- An annual income that is between 26 percent and 50 percent of the regional average (which would be associated with a QOL score of 2),
- An annual income that is between 51 percent and 75 percent of the regional average (which would be associated with a QOL score of 3), or
- An annual income that is above 75 percent of the regional average (which would be associated with a QOL score of 4).

In addition, airports and external stakeholders should consider whether there are local data sets that may be valuable in setting thresholds for some of the quantitative indicators. Although the Indicator Thresholds and Quantitative Data Sources spreadsheet (Appendix B) contains suggested data sets and instructions for obtaining information on each quantitative indicator, in some cases airports may have easy access to data from sources other than those suggested.

Step 2.3. Determine Assessment Scope

In this step, airports and external stakeholders can discuss the pros and cons of undertaking a full QOL assessment, using the survey tool and all 100 indicators, or stopping at Step 2 or 3. Budget and staff resources are an important consideration, as well as quantitative data availability, political considerations, and scheduling (e.g., if there is an ongoing study, survey, or stakeholder outreach effort related to another airport project that may benefit from or may provide data for the QOL assessment).

For airports that do not wish to undertake a full QOL assessment using the complete list of 100 indicators, a more limited mini assessment can be conducted. To conduct a mini assessment, the airport should select a subset of indicators (target between 25 and 30 indicators) across the six QOL categories, including qualitative and quantitative indicators. Assessing this subset of indicators will allow airports to develop a baseline assessment for airport community

QOL in cases where resource constraints make conducting a more comprehensive assessment impractical. Airports can select any number of indicators, but 25 to 35 should be considered the minimum necessary to undertake this type of study. In addition, three indicators that directly relate to airports should be considered for inclusion in a streamlined assessment: EN9 (satisfaction with the environmental stewardship of the airport), EN10 (intensity of aircraft noise annoyance), and T8 (satisfaction with nearest airport).

Step 3. Determine Study Area and Gather Quantitative Data

Although the internal airport stakeholder group will have already discussed the potential study area in Step 1, the proposed study area should be reviewed with the external stakeholders and revised, if appropriate.

Step 3.1. Determine Study Area

The study area will differ from airport to airport based on several unique factors, such as population density, proximity to other airports, political boundaries, availability of data, budget, goals of the airport, and input from external stakeholders. Airports may choose to modify study boundaries for the QOL assessment from previously completed efforts, including the following:

- Environmental assessments or analyses for projects (e.g., to comply with National Environmental Policy Act or state environmental requirements),
- Master plans,
- Studies to develop noise compatibility plans (Part 150 studies),
- Economic impact analyses, and
- Studies of the area for air service development.

These previous studies and plans are likely to have included within their study boundaries all communities where a large number of residents are served by the airport, all communities affected by airport noise, all communities providing significant numbers of employees who work within the airport, as well as all communities located within a given radius of the airport (though the previous categories are likely to cover this category). For simplicity, the airport may wish to select the metropolitan statistical area surrounding the airport as the study boundary.

Step 3.2. Gather Quantitative Data

General instructions for collecting data related to these indicators are included in Chapter 4. Suggested publicly available data sources for each quantitative indicator—along with detailed instructions for finding the information within each source—are contained in the Excel spreadsheet “Appendix B: Indicator Thresholds and Quantitative Data Sources” (tab labeled “Quantitative Data Sources”), found at www.trb.org by searching for “ACRP Research Report 221.” The airport can use the Excel file to enter the QOL scores for each quantitative indicator. The importance scores for each quantitative indicator will be provided by survey respondents, as described in Chapter 2.

Step 4. Administer Survey

Step 4.1. Determine Survey Budget and Methodology

This guidebook does not discuss statistical concepts and survey design principles. However, two reports—*ACRP Report 26: Guidebook for Conducting Airport User Surveys* (Biggs et al. 2009) and *ACRP Web-Only Document 17: Research Methods for Understanding Aircraft Noise Annoyances*

and Sleep Disturbance (National Academies of Sciences, Engineering, and Medicine 2014)—contain extensive information about how to develop and administer surveys, including guidance on sampling methods, how to determine an appropriate sample size for the study population (which will vary from airport to airport), how to prevent bias (to the extent feasible), contracting with external resources, training survey teams, determining logistics, maximizing response rates, and understanding the costs and benefits of various survey administration practices (e.g., in person, web, telephone, and mail).

The QOL assessment lead and internal stakeholder group—with input from the external stakeholders—should consider reviewing the ACRP survey resources previously noted to prepare for a discussion of the survey budget, which will, in turn, influence the survey distribution methodology (i.e., in person, telephone, mail, or web-based). The costs to administer a survey vary considerably based on both sample size and methodology (Biggs et al. 2009). Despite in-person surveys costing more (up to 6 to 8 times the cost of a telephone survey and more when compared to a mail or web survey), they also have better response rates (National Academies of Sciences, Engineering, and Medicine 2014).

Step 4.2. Determine Survey Administrator

This step includes determining whether the airport has the capacity to administer the survey or if it should consider partnering with or contracting to a third party. Airports that have experience administering customer or other types of surveys could use existing procedures for the QOL survey and manage the survey administration internally. Mail and web-based survey distribution methods require the least effort. The ACRP resources on surveys referenced in Step 4.1 are good resources for considering these issues. Some airports may wish to hire a contractor with expertise in surveying to administer the QOL survey. The Quality of Life Assessment Survey Tool (Appendix A) is a PDF that can be converted to an online survey to facilitate survey administration. The research team did this as part of the research process to test the survey, as explained in Appendix G: Examples of Data Visualizations.

Step 4.3. Collect Responses

For this step, the airport or a third party—based on results of decisions in Steps 4.1 and 4.2—will administer the survey and collect responses. Chapter 4 contains details for carrying out these tasks.

Step 5. Analyze Data

Once quantitative data has been gathered and qualitative survey responses have been collected, the airport or third party should score and analyze the results. Analysis may involve additional follow-up and communication with selected participants to clarify some of the survey results. The results should be aggregated and averaged and can be reviewed by category, zip code, municipal boundary, or other demographic variables. Additional information is provided in Chapter 5 and Appendix G: Examples of Data Visualizations.

Step 5.1. Determine QOL Score for Quantitative Indicators Based on Thresholds

Using the indicator thresholds in Appendix B (or adjusted thresholds to reflect local conditions, as discussed in Step 2.2) and the suggested data sources (or local data sources), the airport should assign a QOL score for each quantitative indicator for the study area. This step can also occur parallel to Step 3.2, when the data is initially gathered.

Step 5.2. Calculate Average QOL Score for Each Qualitative Indicator

The airport or third party should calculate the mean QOL score for each qualitative indicator included in the survey. Each answer choice is associated with a QOL score of 1 through 4 (discussed in Chapter 2). The survey administrator should add all QOL scores for each qualitative indicator included on the survey and divide by the number of respondents to obtain the average QOL score for each indicator. The airport can also examine average QOL scores for each indicator for a subset of the full pool of respondents, based on any number of respondent characteristics. For example, the airport could analyze QOL scores for a selected indicator by calculating QOL scores of subsets of respondents divided by location, age group, or other demographics.

Step 5.3. Calculate Average Importance Score for Each Indicator

Based on the survey results, the survey administrator should average the importance score ratings for each quantitative and qualitative indicator. An overall average importance score for each indicator should be calculated first by adding the importance scores for each indicator and then dividing by the number of respondents to obtain the average importance score for each indicator. As needed, the importance scores for any indicator can be examined for respondents divided by location, age group, or other demographics.

Step 5.4. Visualize Data

Once scores for quantitative and qualitative indicators—along with their respective importance scores—are calculated, the results can then be displayed in chart form (or any other manner the airport chooses). A simple approach to visualizing the data uses a quadrant plot to show which QOL indicators are contributing to lower or higher QOL (Figure 5). The quadrant chart allows users to plot the results for each indicator according to its average QOL score (x -axis) and importance score (y -axis) and provides insight into which indicators need to be addressed or monitored. Detailed instructions for developing and using this type of chart are presented in Chapter 5.

Step 6. Review or Update Assessment at Later Date

QOL assessments should help to explain the key factors that influence community QOL, providing useful information for airport decision makers. They provide a mechanism for airports to track how QOL changes over time and whether those changes may be related to airport actions. For these reasons, the airport may wish to develop a summary report or document lessons learned throughout the QOL assessment process. This document will help future airport personnel to update the QOL assessment and demonstrate value of the assessment to stakeholders. This guidebook does not recommend a specific timeline for undertaking an update to a QOL assessment, although every 5 years—or after a significant change in the surrounding communities or at the airport has occurred—is reasonable. The airport does not necessarily need to undertake a full QOL assessment for the update and may choose, instead, to do a streamlined mini assessment or only follow Steps 1 and 2 of the assessment process.

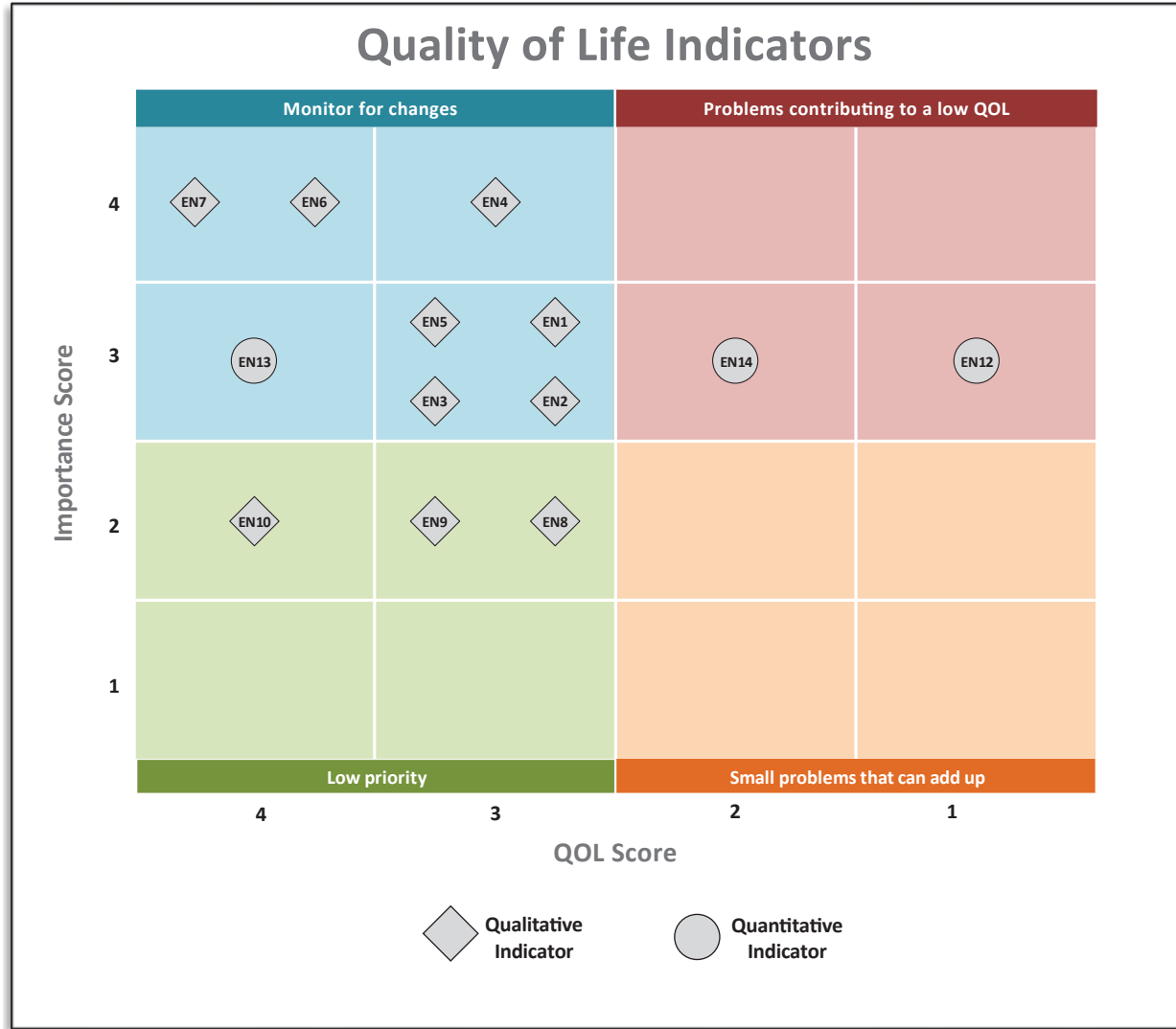


Figure 5. Example quadrant plot.



CHAPTER 4

Gathering Data

Because the Quality of Life Assessment Methodology relies on gathering both quantitative and qualitative information, a full assessment will include QOL scores for both types of indicators. In addition, every indicator in the tool should be ranked by survey participants with an importance score to facilitate weighting. As noted in Section 2.4, not every indicator is of equal importance to others in the overall assessment, based on individual replies. Therefore, it is useful to have survey participants rank all indicators (quantitative and qualitative) with an importance score of 1 to 4 (with 1 representing low importance to the overall assessment and 4 representing high importance, or a more central contributor to QOL).

4.1 Gathering Data for Quantitative Indicators

As described in Chapter 3, airport personnel should gather publicly available data as part of Step 3 for each of the quantitative indicators that will be evaluated in their QOL assessment. Data gathering efforts will likely be managed by the lead individual or department but involve support from others on the core decision-making team to coordinate, collect, and compile data from their respective departments (e.g., operations and maintenance, public safety, environment, and sustainability).

Recommended publicly available data sources are provided for each quantitative indicator (in the *Quantitative Data Sources* tab of the Excel spreadsheet that comprises Appendix B). These sources include government databases, such as the U.S. Census Bureau database for demographic data; the Federal Bureau of Investigation database for crime statistics; and other nongovernmental sources, such as annual reports on city park systems published by the Trust for Public Land. The data sources recommended for each quantitative indicator include one or more websites from which data can be obtained. Data from these sources are used to determine the QOL score for each of the selected indicators, following the approach described in Chapter 3. Additional instructions are provided in the Appendix B Excel spreadsheet for how to identify the necessary data at the recommended sources or websites, process the data, and calculate results for each quantitative indicator.

Quantitative data may also be gathered as part of Step 2, when airports are building relationships with and gathering additional insight from other stakeholders (e.g., service providers, local government, metropolitan planning organizations, and local businesses). During this step of the QOL process, airports may identify important data gaps, as well as more up-to-date or relevant local sources of data that can be used to evaluate the selected quantitative indicators. For example, a municipal government may have more recent or accurate sources of data than the data sets recommended in Appendix B. In these cases, airports should use the alternate local data sources, provided that they represent the same QOL metrics. For example, Indicator T10 (active transportation for commuting) relies on data available through the U.S. Census Bureau

that was collected in the 2017 American Community Survey. Cities or towns that have conducted analyses of commuting patterns within their communities may be able to use more local or recent data in lieu of those available through the U.S. Census Bureau website.

The same applies for data recommended for evaluating many of the other quantitative indicators (e.g., voter turnout and job opportunities). In some cases, airport departments may already work with relevant data sets and be able to gather indicator values quickly from pre-existing reports used for other purposes. When conducting a QOL assessment, airports are encouraged to gather data from local planning reports and documents and work with city managers, local chambers of commerce, universities, and so on to obtain data that best represent the boundaries of the study area, to the extent possible.

The quantitative indicators should be collected and calculated according to the instructions in Appendix B. Results should then be compared to the unique thresholds listed to determine the corresponding QOL scores for each indicator.

As an example, consider Indicator EN12 (outdoor air quality). If evaluating this indicator for a QOL assessment, one would use data from the U.S. Environmental Protection Agency (EPA) National Ambient Air Quality Standards (NAAQS) database following the directions provided in Appendix B. This requires generating an Air Quality Index (AQI) report for the most recent full year of data by selecting the appropriate city or town and the appropriate year from the dropdown menu at the recommended website. The resulting value in the column labeled “AQI Median” should then be compared to the indicator threshold criteria and assigned a QOL score, as described in the following:

- Assign a QOL score of 1 if this result is 44 or more.
- Assign a QOL score of 2 if this result is between 40 and 44.
- Assign a QOL score of 3 if this result is between 36 and 40.
- Assign a QOL score of 4 if this result is less than 36.

In this example, if the EPA NAAQS database shows that the city in question had a median Air Quality Index of 43 for the most recent year of complete data, then—according to the indicator thresholds—this would result in a QOL score of 2 for EN12.

The Quality of Life Assessment Methodology identifies relevant and user-friendly data sources to facilitate the data collection process. Most indicators only require looking up a single data value and comparing this value to the indicator thresholds. For example, obtaining data related to Indicator E15 (household income) simply requires navigating to the U.S. Census Bureau website at <https://data.census.gov/>, searching for the appropriate city or town by name, and locating the value for median household income on the city or town’s profile page.

Some indicators involve more in-depth calculations using data gathered from more than one source or looking up results in large online databases or downloadable spreadsheets. Detailed instructions are provided in Appendix B to obtain data from these sources. For example, Indicator H19 (workplace safety) requires users to first download the Severe Injury Reports data table from the Occupational Safety and Health Administration website. Then the downloaded data table should be used to identify the number of injury reports occurring in a specific city or town. The resulting number should then be divided by the population (per 100,000 residents) in the corresponding year obtained from the U.S. Census Bureau website.

Indicator EN14 (amount of protected land) is unique in that it requires the use of ArcGIS [a geographic information system (GIS) for working with maps and geographic information] to calculate an indicator value from a shapefile (an Esri vector data storage format for storing the location, shape, and attributes of a geographic feature). The research team recommends obtaining the help of an individual trained in basic GIS and following the instructions included

in Appendix B to calculate a value for this indicator. Another option is to remove this indicator from the assessment. The methodology has some built-in redundancy among the indicators, allowing for flexibility in case data cannot be easily obtained to score every indicator. In general, a few dropped indicators will not compromise the overall value of the assessment.

Note that most indicators rely on data at the city or town scale, but there are other indicators for which data at this scale do not exist or are less appropriate than data from a larger spatial scale, such as a county. For example, data for Indicators T12 (vehicle safety) and G15 (emergency medical response time) are only readily available to users at the county scale. Data for Indicator G17 (voter turnout) is not available from a comprehensive, standardized database. Thus, users will have to obtain the best available data through local government websites.

When gathering data for quantitative indicators as part of assessment Steps 2 and 3, guidebook users should be mindful that these indicators only represent a small subset of QOL components. If resources are available to gather qualitative information from the residents in the communities potentially affected by airport operations, users are encouraged to collect such information from a representative sample of the community following the process described in Section 4.2.

4.2 Gathering Data for Qualitative Indicators

The majority of the 100 indicators recommended for conducting a full QOL assessment of the community or communities surrounding the airport are qualitative indicators. Qualitative information about the QOL of community residents should be gathered from a representative sample of the residents.

Under Step 2 (Engage external stakeholders), it will be valuable for airport personnel and external stakeholders to discuss the qualitative indicators and consider how they anticipate that residents would score various indicators. As described in Chapter 2, scoring of indicators includes determination of QOL scores and determination of importance scores. The former shows how an individual's or—collectively—the community's QOL is affected by the QOL component represented by the indicator (with 1 representing low QOL and 4 representing high QOL, with respect to each indicator). The latter shows how the component represented by the indicator should be weighted in the overall assessment, regardless of the QOL score assigned (i.e., how important that indicator is to the individual's QOL or how important the indicator is to the community once importance scores have been averaged). In other words, if the indicator is very important to overall QOL (given a high importance score by respondents), a very low QOL score would result in a very low overall QOL.

Steps 1 through 3 allow an airport to make valuable strides in understanding community QOL. Simply convening airport staff from diverse departments (under Step 1) to discuss community QOL can enhance internal understanding of various contributors to the airport's overall impact on the community (i.e., positive, neutral, and negative). By discussing the individual indicators in the Quality of Life Assessment Methodology and considering airport decisions from a more holistic lens, it is likely that areas for improvement—as well as areas where the airport already has a positive impact on the community—can be readily identified.

Under Step 2, engaging community leaders and bringing other stakeholders from outside of the airport into the conversation can yield even more insight into the airport's ability to affect community QOL. When discussing the assessment scope and selection of indicators, internal and external stakeholders should consider how individual residents may interpret the questions included in Appendix A: Quality of Life Assessment Survey Tool to ensure that they can be understood in the context of the community (as discussed in Section 2.2). External stakeholders

involved in the QOL assessment development process may not necessarily answer the questions used to gather the qualitative information in the same ways that other community residents would, so they should consider interpretation of the questions from a resident's point of view. To ensure that they are comprehensible to a local audience, any edits that are needed to the survey tool provided in Appendix A should be made prior to being administered to a representative sample of community residents.

As airport personnel and external stakeholders discuss the details of and the value of the QOL assessment under Steps 1 and 2, they may determine that these steps are sufficient to meet the goals of the QOL assessment process for their airport at that time. Or, the discussions may lead to the conclusion that there are enough resources for the airport or one or more of the stakeholders to spearhead a full QOL assessment in the community and to complete additional steps. In the latter case, the airport personnel and the external stakeholders should decide on the appropriate geographic boundaries for the QOL assessment (e.g., one town abutting the airport, several neighborhoods, or a large metropolitan statistical area). Regardless of the scale selected, decisions about the method of distribution of the survey with the qualitative indicators should also be made.

Multiple participants at the methodology validation workshops identified the concern that survey bias may occur if community members who view the airport negatively intentionally attempt to skew the results of the assessment, particularly if they are able to coordinate and communicate with potential survey respondents in advance of survey administration. It is impossible to eliminate such interference entirely, but there are a few barriers built into the QOL assessment process to prevent this from occurring. First, only three indicators present respondents the opportunity to provide input specific to the airport. Even if the respondent's answers correspond with a low QOL score for those three indicators, and if they rate those three indicators each as "very important," there are still 97 additional indicators that contribute to the individual's overall QOL. Second, if the airport works with a third party to administer the survey, it may not be apparent to respondents that the questions are for a study commissioned by the airport. Third, the first indicator on the survey asks respondents to rate their overall QOL before participants see any other questions. This can serve as a check to compare against respondents' other answers. Finally, the survey should be distributed to a representative sample of the defined study area. It is not likely that the community members with negative views of the airport would have the capacity to get their message out to the entire possible pool of survey respondents in the study area.

4.2.1 Administering the Quality of Life Assessment Survey Tool

When conducting a full-scale assessment under Step 4, an airport or other QOL assessment proponent may choose to contract with a third party to administer the survey. This may be helpful in eliminating or mitigating any real or potential bias that respondents may have with regard to attitude toward or perception of the airport. It could also be necessary if the airport does not have the internal workforce to administer the survey or if it wants to bring in external expertise. Otherwise, an appropriate airport department or independent external stakeholder that was involved in the previous steps of the QOL process could spearhead administration of the survey directly.

Because the survey intends to collect information about individuals and responses may include personally identifiable information, the airport or third party should ensure that it complies with any research processes for human subjects that are in place at its organization prior to administering the survey. These processes may include the need for institutional review board assessment and approval of the study. Institutional review boards are intended to ensure

the protection of the rights and welfare of human research subjects recruited to participate in studies. It is likely that some airport departments and stakeholders are already familiar with such processes from administering surveys for other purposes.

The airport or third party could choose to administer the survey using a variety of methods, depending on its resources and QOL assessment scope. For example, the survey could be administered via a mass mailing to a selection of residents within the agreed-upon geographic study area. In this case, respondents could be provided the option to mail in hard copy versions of survey responses or enter them via a secure online portal. Less data entry would be required on behalf of the airport or third party if either chooses to set up a web page to collect responses and store data. The airport could also use an online survey tool (e.g., Qualtrics, SurveyGizmo, and Survey Monkey) to administer the survey and collect responses. Alternatively, staff—or a third party contracted by the airport—may devise a method for administering the survey to participants in person. These decisions depend in part on the size of the community in the study area, the number of participants required to achieve a reasonably representative cross-section of the community (with regard to socioeconomic status, race, gender, proximity to the airport, age, and so on), and resources allocated for the study. Costs and benefits of various survey administration options are discussed in *ACRP Report 26* (Biggs et al. 2009) and *ACRP Web-Only Document 17* (National Academies of Sciences, Engineering, and Medicine 2014). The decisions should be made during discussions under Step 4.

Once a methodology for selecting potential survey participants and collecting responses has been selected, use of the survey for collecting and then evaluating information from respondents should be straightforward. Survey participants respond to each of the qualitative indicator questions by reading the four answer choices and selecting the one that best represents their own life and experience. Each answer is associated with a QOL score from 1 (representing low QOL with respect to the component represented by the indicator) to 4 (representing high QOL). The survey participants also weight each indicator with an importance score from 1 through 4, with 1 representing low importance of the indicator in the context of the overall assessment, and 4 representing high importance. Survey participants select an importance score for all of the quantitative indicators in the assessment, even though they will not have the opportunity to select a QOL score for these indicators. This is because the data value for the community is predetermined by hard data sets, and scoring of QOL for these indicators will have been completed during quantitative data collection efforts in Step 3.

Once data are collected through the survey, the airport can conduct the analysis (Step 5) as described in Chapter 5. In developing the guidebook, a small sample of participants (comprised of members of the research team living within the service area of a large international airport) filled out the survey to provide data to illustrate the analysis process. This information is described in the following chapter.



CHAPTER 5

Analyzing and Communicating Results of Assessment

This chapter presents instructions for basic analysis and presentation of the qualitative and quantitative data that are gathered as part of a QOL assessment (Step 5 of the process). Because each assessment will lead to unique results, the suggestions for data presentation below are necessarily general. However, to illustrate how data analysis and visualization may work, the research team informally gathered qualitative data responses from a small sample of 32 volunteers living within the service area of a large international airport and quantitative data from publicly available data sets covering the same spatial area. The individuals participating in this example assessment are employed by the research team contractor firms and are not representative of the diversity of the population in the study area. Thus, the results of this assessment are not meaningful as a full scale QOL assessment on a representative population surrounding an airport. Rather, these results are used merely to illustrate how one could use the following approaches to analyze survey responses and to communicate meaningful information about QOL in communities surrounding an airport. Additional details are provided in Appendix G: Examples of Data Visualizations.

5.1 Visualizing Data in a Quadrant Plot

After compiling participants' responses and indicator scores in a spreadsheet, many options are available for visualizing the data and presenting them for interpretation, analysis, and decision-support purposes. The Quality of Life Assessment Methodology was designed to allow for simple visualization of the final QOL data in the form of quadrant graphs that display indicators along two axes: QOL score and importance score (Figure 5). Such graphs can display indicators for an individual category (e.g., transportation, social relationships, or environment); exclusively qualitative or quantitative indicators; or all indicators across the assessment categories and indicator types, among other analysis options.

Figure 5 uses data from the environmental category of the assessment framework. In this plot, the research team presents average results calculated for each qualitative indicator (represented by the diamond icons), based on responses from a small sample of 32 individuals living near the airport and results for the quantitative indicators (represented by the circle icons), based on publicly available data sets. For both types of indicators, the research team plots average QOL and importance scores as reported from the 32 participants.

For an airport or other entity interested in understanding what issues drive QOL determination in a community, it is useful to plot an average of QOL scores based on the results for a representative group of individuals in the community. Additionally, indicators for one individual can be plotted in a quadrant plot. Averaging QOL scores for individuals participating in the assessment, and averaging corresponding importance scores for assessment indicators,

can be somewhat challenging. Appendix F: Sample Quality of Life Assessment Introduction PowerPoint, found at www.trb.org by searching for “ACRP Research Report 221,” discusses some of the choices that can be made to ensure that the quadrant plot is easy to interpret and that important issues do not get diluted just because a portion of the population is not concerned about them. For the purposes of Figure 5, a simple average was used to obtain a single QOL score for each of the qualitative indicators and an importance score for each of the qualitative and quantitative indicators. These values were then rounded to the nearest whole number to determine which quadrant each indicator fell within. For example, 32 participants in the example assessment responded to the question for qualitative Indicator EN8 on light pollution (i.e., how much are you bothered by light pollution from streetlights, cars, buildings, billboards, etc.?) by choosing one of the following responses: (1) extremely, (2) somewhat, (3) very little, and (4) not at all. These results were translated into QOL scores ranging from 1 to 4, and the average of the QOL scores for the 32 respondents was calculated at a value of 2.6. This QOL score was then rounded to the nearest whole number (i.e., a value of 3). A similar process was followed for the importance score, which was estimated and rounded to a value of 2. Therefore, Indicator EN8 has a QOL score of 3 and an importance score of 2 and falls within the “low priority” quadrant.

Regardless of how the results are averaged, as long as the quadrant plots display indicators for some categories across more than one quadrant (three or four quadrants being the ideal), the visualization is likely to be helpful in setting priorities and stimulating ongoing discussions about what brings about or serves as an obstacle to the pursuit of high QOL for community residents. The visualizations allow straightforward interpretations of what the qualitative and quantitative indicators mean for a local community’s QOL and what steps an airport may take to improve QOL in the surrounding community or to lessen their impact on QOL.

5.2 Interpreting a Quadrant Plot

As shown in Figure 5, importance scores are presented on the vertical y -axis beginning with a score equal to 1, and QOL scores are presented on the horizontal x -axis beginning with a QOL score of 4. This organization results in a quadrant providing quick visualization and simple interpretation of the various aspects of QOL represented by the qualitative and quantitative indicators. Each quadrant is defined by a unique combination of QOL and importance scores (1 through 4) and categorized based on priority into the following groups:

- Low priority = high QOL (3 or 4) and low importance (1 or 2).
- Small problems that can add up = QOL and importance both low (1 or 2).
- Monitor for changes = QOL and importance both high (3 or 4).
- Problems contributing to a low QOL = low QOL (1 or 2) and high importance (3 or 4).

Identification numbers are included for each qualitative and quantitative indicator in the visualizations to allow the reader to determine exactly what aspects of QOL are being shown within each quadrant.

As noted above, airports and their stakeholders are interested in analysis and interpretation of indicator results that represent a compilation, aggregation, or average QOL score for the indicator in question. When all indicators are plotted on the quadrant plot for the communities in question, it becomes clear what the critical problems are (those indicators in the upper right quadrant of the plot). In this way, the quadrant plot can be used to facilitate the interpretation of QOL assessment results and, more importantly, assist airports in identifying QOL issues in the surrounding communities that should be addressed or monitored for changes.

Qualitative and quantitative indicators with high importance weights and high QOL scores show the areas where communities are doing well. For example, if a qualitative or quantitative indicator ranked as highly important is also identified as demonstrating high QOL, the airport may consider the community as thriving with respect to that data point or topic (“monitor for changes”). This means that the community has an inherently high QOL or has already taken steps to increase QOL. The term “monitor for changes” indicates that even though QOL is currently high for the indicator, it would be prudent to remain aware of how that indicator may be affected by future airport decisions because the indicator was ranked as very important to overall QOL. Conversely, indicators with high importance scores and low QOL scores demonstrate opportunities for improvement in the community. The problems may need to be addressed by individuals or local organizations within the community, health care professionals, city or local governments, or others. In some cases, the airport may be able to help address the problem over time. Regardless, it will be helpful for the airport to be aware of issues contributing to lower QOL in the community. Quadrant plots can be used to identify indicators—and associated issues—that represent problems for community stakeholders.

Overall QOL for an individual and aggregated community-level QOL is dependent on many factors. The Quality of Life Assessment Methodology presented in this guidebook is intended to reflect these factors in the 100 indicators that cover various aspects of overall QOL over six categories. Results for an individual could show that many indicators of high importance (i.e., importance score of 3 or 4) reflect a low QOL score (i.e., QOL score of 1 or 2), which could point to an overall low QOL for that individual. Similarly, if many indicators of high importance receive a high QOL score for an individual, it may be that the individual has a very high QOL. The same is true when considering aggregated averaged QOL scores for the entire community or study area. This information can be easily communicated via quadrant plots.

5.3 Examples of Quadrant Plots

The research team created an example data set by gathering information from a small sample of 32 individuals residing near a large international airport. Participants were asked to respond to the questions developed for each of the qualitative indicators in an online survey, as well as to rank the importance of each qualitative and quantitative indicator to their overall QOL or the QOL of their community (in the case of indicators focused on larger community issues or vulnerable populations). Additional demographic information was collected to better understand and characterize the sample of participants (e.g., age, gender identity, race or ethnicity, marital status, education, income, current housing situation, and proximity to the nearest major airport). Collection of this demographic information is optional but may be useful as an airport analyzes assessment results and seeks to understand patterns in the data. The research team concurrently gathered publicly available data at the scale of the community being assessed—or the region, if finer scale data were not available—for each of the quantitative indicators, following the approach described in Section 4.1 and the detailed instructions provided in Appendix B.

For all qualitative and quantitative indicators, the research team assigned an importance score of 1 through 4 to each of the participants’ responses. For example, for one indicator a response of “not at all” equals an importance score of 1, a response of “a little” equals an importance score of 2, a response of “somewhat” equals an importance score of 3, and a response of “extremely” equals an importance score of 4. For the quantitative indicators and as described in Section 4.1, the research team gathered available data for each indicator, reviewed the indicator’s data thresholds (e.g., separating data values that would give the indicator a score in the low QOL range from data values that would give the indicator a score in the moderate

QOL range), and then assigned QOL scores of 1 through 4, based on the data value for the community. The averages of importance scores and QOL scores were calculated, as described in Chapter 4.

Discussions of example quadrant plots from this data set are found in Section 5.3.1 and Section 5.3.2 for environmental indicators and transportation indicators, respectively. Details on the sample population and additional example quadrant plots are provided in Appendix G.

5.3.1 Example Quadrant Plot for Environmental Indicators

The sample quadrant plot in Figure 5 presents results for all the indicators within the environmental category. While the data shown on this plot are *not* representative of the community surrounding the airport, the data can be used to illustrate how one would interpret such a plot. Most of the qualitative and quantitative indicator data for this category plot to the “monitor for changes” quadrant (i.e., high QOL and high importance). These are indicators that participants found to be highly important to their overall QOL and that were sufficiently addressed with respect to QOL in their community. For example, qualitative Indicators EN4 (local aesthetics) and EN7 (convenience to amenities) fall within this quadrant. The sample data suggest that while participants consider these indicators to be important to their overall QOL, both are sufficiently addressed in the local community. More specifically, these results indicate that participants, on average, find their community to be very attractive and feel that they have easy access to local amenities.

There may be some outliers hidden by the averaging process. That is, it may be that some portion (perhaps 10 percent) of assessment participants scored these indicators in the low QOL range. The averaging of responses from 32 participants—or many hundreds, if conducting a full-scale community assessment—can mask information about the distribution of responses, some of which may be valuable for airports to be aware of. To address this issue, it would be valuable for airports to graph the distribution of responses for each indicator. Such graphs could be made accessible within a quadrant plot, such that when a user clicks on an icon for an indicator, a small graph of the data distribution for that indicator pops up.

In Figure 5, quantitative Indicators EN12 (outdoor air quality) and EN14 (amount of protected area) fall within the “problems contributing to a low QOL” quadrant (low QOL and high importance). These indicators represent QOL components that the participants found to be highly important but for which publicly available data suggest a low QOL. For Indicator EN12, the median air quality index for the area mapped to the range of values developed to represent a QOL score of 1. For Indicator EN14, the percentage of land in the city that is under at least some degree of legal protection from development mapped to a QOL score of 2.

The indicators that appear in the “low priority” quadrant include EN8 (light pollution), EN9 (satisfaction with the environmental stewardship of the nearest airport), and EN10 (intensity of aircraft noise annoyance). Participants found the components reflected by these indicators to be of low importance and to have a high QOL.

Not all of the QOL indicators in Figure 5 are directly affected by airports, but it may be worthwhile for airports to consider these factors when planning activities or events or—more broadly—when evaluating the effect of airport operations on the surrounding community. For example, the local airport may wish to remain mindful of any issues reflected by indicators within the “monitor for changes” quadrant (e.g., local aesthetics and quality of parks and natural spaces) and should consider whether there are ways to work with the local community to help address issues appearing in the “problems contributing to a low QOL” quadrant (e.g., amount of protected area). These efforts would help ensure that any future planned activities or projects at the airport do not negatively affect QOL for the surrounding community.

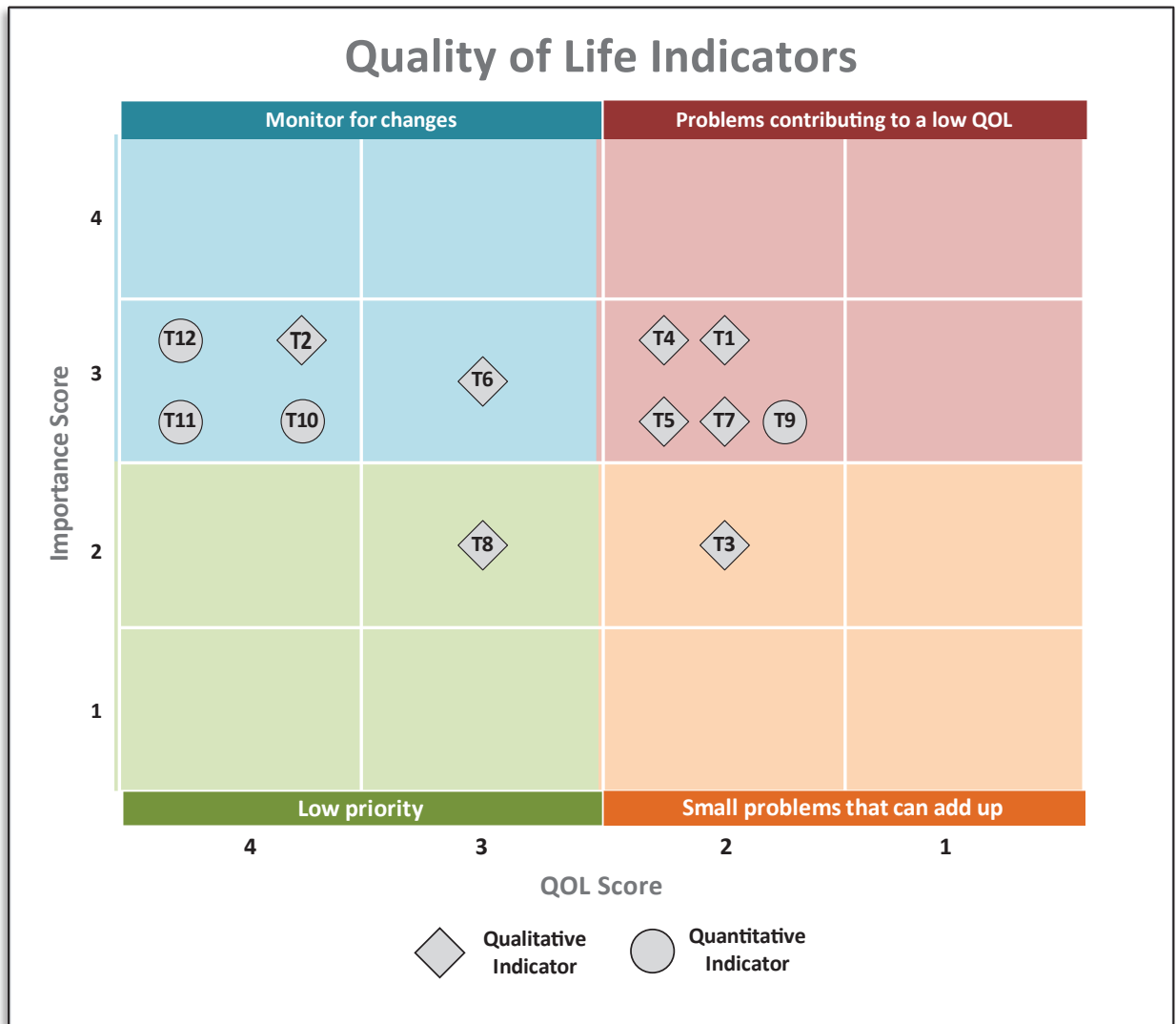


Figure 6. Sample quadrant plot for transportation indicators.

5.3.2 Example Quadrant Plot for Transportation Indicators

Figure 6 is an example quadrant plot from the sample population for transportation-related indicators. In this plot, there are a fair number of indicators within the “problems contributing to a low QOL” quadrant, including:

- Traffic congestion (qualitative Indicator T1 and quantitative Indicator T9),
- Transportation system redundancy (qualitative Indicator T4),
- Maintenance of transportation infrastructure (qualitative Indicator T5), and
- Access to transportation by vulnerable populations (qualitative Indicator T7).

Even though data from this sample of the population suggest that satisfaction with the nearest airport (Indicator T8) is a low priority, the airport will benefit from greater awareness of the issues—as previously listed—that were identified by their local community members (if this were a full assessment of that community). Airports may wish to consider these issues in planning decisions and when working with and communicating with the local community on many topics of interest.

5.4 Communicating Results

The goal of a QOL assessment is not for airports to calculate an overall QOL score for comparison to other airports, but rather to stimulate increased communication and understanding within an airport (among different departments, which may have unique perspectives on how they affect and are affected by the community outside the airport), with community leaders and stakeholders, and with the community outside of the airport as a whole. QOL assessment results can serve as a useful tool in facilitating that understanding via presentations and publications that can be made available to those beyond the initial group engaged with development or ongoing meetings about the assessment. Further, assessment results can help airports target planning, community outreach, or environmental efforts and focus on preserving or increasing QOL in those QOL areas considered to be most important by community members.

The quadrant plots previously described offer a tool for airports to display indicators of QOL in the surrounding community—including which issues are high priority—to airport departments not involved in the assessment process, to committees where community members are included, and to airport management. QOL assessment results may have very practical consequences with regard to what airport decisions need to be vetted with community members, and assessment results may serve as a starting point for discussing issues that either the airport or community leaders believe warrant further discussion. In some cases, showcasing an understanding that the airport is aware of community priorities may go a long way toward making discussions with community members more productive than they would be otherwise. Though airports may not have a direct effect on all the indicators included in the QOL assessment, indicators appearing in the “problems contributing to a low QOL” quadrant should be considered when making decisions concerning operations, planning, project development, and so on.

As noted, the tool considers QOL across multiple categories. This allows for understanding the breadth of QOL across a community, relative QOL among the categories, and to assess progress over time as the tool is used iteratively. As the Quality of Life Assessment Methodology framework is applied iteratively, applying the indicators necessitates interaction with and between airport stakeholders. These interactions provide additional learning and coordination opportunities, and these interactions can be used to further refine the QOL assessments and prioritize activities in response to the assessments’ findings.



CHAPTER 6

Conclusion

Airports are a part of the communities they serve. Acting as employers, centers of commerce, and transportation hubs, airports connect their communities to the world outside of their immediate environment. Because of their large role, airports also impact the QOL of surrounding neighborhoods and nearby cities in positive and negative ways. In addition, airports are themselves affected by larger trends in their communities—such as development patterns in neighboring cities—over which they may have little to no control. For these reasons, the airport will benefit from considering the QOL of surrounding communities.

6.1 Recommended Further Research

This guidebook provides a methodology and a progressive, step-by-step approach for conducting a QOL assessment. As described in Chapter 3 and further in Appendix C: Existing Quality of Life Resources, the methodology was validated with three partner airports through virtual meetings and in-person workshops with both internal (i.e., airport) stakeholders and community representatives. However, the scope of this research did not include the completion of either a complete or a streamlined QOL assessment for an airport. While the guidebook provides instructions for how an airport can implement the assessment methodology, the industry would benefit from information gathered during a real-world pilot study of a QOL assessment. Therefore, the research team recommends that ACRP consider a subsequent project to implement a full QOL assessment and a streamlined mini assessment at two airports. Ideally, the airports selected would differ in size and geographic location.

- The full QOL Assessment Pilot Study would document a volunteer airport's implementation of the methodology from Step 1 through Step 5. The assessment would include all 100 indicators across the six QOL categories. The airport would work through the steps to initiate a QOL dialogue; build an internal stakeholder group; gather quantitative data; engage external stakeholder organizations; identify the study area; administer the survey; consider supplemental metrics, if necessary; and create the quadrant score charts to depict the results. The research should include the development of a case study at the conclusion of the assessment to provide the airport industry with lessons learned and any resulting modifications made to improve the methodology.
- The streamlined mini QOL Assessment Pilot Study would follow the same approach but with fewer indicators selected. The airport would work with the selected research team to identify a subset of the 100 indicators to investigate, selecting several from each of the six categories. The results of the streamlined assessment should also be developed into a case study.

Both case studies would be published and added to the guidebook as an addendum or additional chapter after publication. The case studies would provide additional real-world information to airports on how to plan, execute, evaluate, and improve the QOL assessment process. Feedback from community members could be obtained with regard to the efficacy of the communication efforts.



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Acronyms

ACI-NA	Airports Council International–North America
ACRP	Airport Cooperative Research Program
ATAG	Air Transport Action Group
DFW	Dallas–Fort Worth International Airport
EJ	Environmental justice
EPA	U.S. Environmental Protection Agency
EQOL	Environmental-related quality of life
FAA	Federal Aviation Administration
HQOL	Health-related quality of life
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
Minnesota DOT	Minnesota Department of Transportation
MPO	Metropolitan Planning Organization
OECD	Organisation for Economic Co-operation and Development
PBN	Performance-based navigation
PWM	Portland International Jetport (Portland, Maine)
QOL	Quality of Life
SDG	Sustainable Development Goals (United Nations)
SMP	Sustainability management or master plan
SRPB	Spiritual, religious, and personal beliefs (subset of the WHO QOL instrument)
STAR	Sustainability Tools for Assessing and Rating (communities)
TPA	Tampa International Airport
UN	United Nations
WHO	World Health Organization



APPENDIX A

Quality of Life Assessment Survey Tool

The Quality of Life Assessment Survey includes questions that address all qualitative indicators in each of the six categories, as well as questions that ask the responder to rate the importance of all quantitative and qualitative indicators to their quality of life or the QOL of their community. This survey can be administered as written or adjusted to reflect a streamlined assessment or to include supplemental indicators. The survey can be administered in a paper format or using any number of publicly available online survey tools, depending on the airport or assessment proponent's needs and resources. The survey follows and also can be found at www.trb.org by searching for "ACRP Research Report 221."

Quality of Life Assessment Survey Tool

This survey is intended to capture your input concerning a variety of quality of life indicators. The indicators are organized into six high-level categories: 1) environmental, 2) health, 3) economic, 4) transportation, 5) social relationships, and 6) local governance/community services. Qualitative indicators are included in the assessment as questions with four answer choices. Each qualitative indicator question is followed by an additional question regarding the indicator's importance to you or your community's overall quality of life. Data for quantitative indicators will be collected separately by the research team, but we have included those indicators here in order to obtain input on their relative importance to quality of life in your community. If you do not wish to answer a question or it does not apply to you, please leave it blank and continue the survey.

Your participation in this survey is voluntary, and your responses are anonymous. Individual responses will not be reported; they will be combined with the input from others as part of a comprehensive quality of life study for your community.

Quality of Life Survey Questions

Q1: Overall quality of life

How would you rate your overall quality of life?

- 1 - Very low
- 2
- 3
- 4 – Very high

Environmental Indicators

EN1: Satisfaction with local air and water quality

How satisfied are you with air and water quality in your community?

- Dissatisfied
- Somewhat dissatisfied
- Somewhat satisfied
- Satisfied

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

EN2: Quality of parks and natural spaces

How satisfied are you with the quality of parks, natural spaces, or green spaces in your community (including cleanliness, safety, features)?

- Dissatisfied
- Somewhat dissatisfied
- Somewhat satisfied
- Satisfied

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

EN3: Frequency of visiting parks and natural spaces

How satisfied are you with the frequency with which you visited parks or undeveloped, natural spaces in the past year?

- Dissatisfied
- Somewhat dissatisfied
- Somewhat satisfied
- Satisfied

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

EN4: Local aesthetics

In general, how attractive is your community to you?

- Very unattractive
- Somewhat unattractive
- Somewhat attractive
- Very attractive

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

EN5: Water quantity

How confident are you with the ability of your community to supply adequate water resources (consider topics such as over-development, drought, availability, reliability, infrastructure, contamination, etc.)?

- Not at all
- Very little
- Somewhat
- To a great extent

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

EN6: Satisfaction with housing

How satisfied are you with your current housing situation?

- Dissatisfied
- Somewhat dissatisfied
- Somewhat satisfied
- Satisfied

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

EN7: Convenience to amenities

How easy is it for you to access local amenities (retail stores, grocery stores, gas stations, etc.)?

- Very difficult
- Somewhat difficult
- Somewhat easy
- Very easy

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

EN8: Light pollution

How much are you bothered by light pollution from streetlights, cars, buildings, billboards, etc.?

- Extremely
- Somewhat
- Very little
- Not at all

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

EN9: Satisfaction with the environmental stewardship of nearest airport

How satisfied are you with the environmental stewardship of your nearest airport, including sustainability initiatives, handling of wildlife, decreasing emissions, protecting air and water quality, etc.?

- Dissatisfied
- Somewhat dissatisfied
- Somewhat satisfied
- Satisfied
- I do not know

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

EN10: Intensity of aircraft noise annoyance

Thinking about the last 12 months or so, when you are at home, how much does noise from aircraft bother, disturb, or annoy you?

- Extremely
- Very
- Moderately
- Slightly
- Not at all

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

Note: There are five answer choices available for this question, for consistency with international standards for surveying concerning noise annoyance from aircraft, as developed under ACRP's Research Methods for Understanding Aircraft Noise Annoyances and Sleep Disturbance and as used in the Federal Aviation Administration's (FAA) National Airports Annoyance Survey. For the purposes of conducting a QOL assessment, responses indicating the lowest levels of annoyance (i.e., "Slightly" and "Not at all") should be scored with a "4", indicating high QOL with respect to this indicator.

EN11: Environmental Justice

The U.S. Environmental Protection Agency (EPA) defines environmental justice as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental and commercial operations or policies". How well do you feel environmental justice is addressed in your community and by your local government?

- Not addressed at all or addressed poorly
- Addressed a little
- Somewhat well addressed
- Addressed very well
- I do not know

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

EN12: Outdoor air quality (Quantitative)

This indicator measures the median air quality index (AQI) for your city/town.

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

EN13: Amount of public parkland (Quantitative)

This indicator measures the percentage of land in your city/town that is classified as public parkland.

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

EN14: Amount of protected areas (Quantitative)

This indicator measures the percentage of land in your community that is under at least some degree of legal protection from development.

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

Health Indicators**H1: Satisfaction with health**

How satisfied are you with the level of your health?

- Dissatisfied
- Somewhat dissatisfied
- Somewhat satisfied
- Satisfied

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

H2: Physical health status

How would you rate your level of physical health on a scale from 1 - 4?

- 1 - Very poor
- 2
- 3
- 4 - Very good

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

H3: Mental health status

How would you rate your mental health on a scale from 1 - 4?

- 1 - Very poor
- 2
- 3
- 4 - Very good

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

H4: Impact of health on ability to perform daily activities

To what extent do any ongoing physical or mental health problems interfere with your ability to perform day-to-day activities?

- Health problems significantly impact my day-to-day activities
- Moderate impact
- Little impact
- No impact

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

H5: Exercise frequency

How often do you engage in 30 minutes of moderate or intense exercise?

- Less than once a week
- Once a week
- 2 times a week
- 3 times a week or more

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

H6: Diet

How often do you eat fast food?

- Rarely or never
- A few times per year
- A few times per month
- 3 or more times per week

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

H7: Level of stress

How would you rate your level of stress over the past month on a scale of 1 - 4?

- 1 - Very low
- 2
- 3
- 4 - Very high

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

H8: Meaning and purpose in life

To what extent do you feel that your life has purpose or meaning?

- Not at all
- A little
- Somewhat
- To a great extent

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

H9: Self-esteem

How would you rate your self-esteem on a scale of 1 - 4?

- 1 - Very low
- 2
- 3
- 4 - Very high

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

H10: Hope and optimism

How optimistic or pessimistic do you consider yourself?

- Very pessimistic
- Somewhat pessimistic
- Somewhat optimistic
- Very optimistic

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

H11: Recent happiness

What has been your level of happiness in the past month on a scale of 1-4?

- 1 - Very unhappy
- 2
- 3
- 4 - Very happy

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

H12: Screen use

How much time **per day** in the past week did you spend looking at a television, computer, smart phone or other electronic screen?

- More than 8 hours
- Between 4 and 8 hours
- Between 2 and 4 hours
- Less than 2 hours

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

H13: Access to health care

How accessible are health care facilities and services to you (consider the following: location of health care providers, access to health care specialists, affordability of services, acceptance of health insurance, etc.)?

- Very inaccessible
- Somewhat inaccessible
- Accessible enough
- Extremely accessible

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

H14: Access to recreation facilities (indoor or outdoor)

How would you rate your access to indoor or outdoor recreational facilities?

- No access
- Little access
- Some access
- Considerable access

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

H15: Ability to obtain fruits and vegetables

How accessible and affordable for you are local grocery stores, markets, or other sources of fresh produce?

- Very inaccessible and unaffordable
- Somewhat inaccessible or difficult to afford
- Accessible and affordable enough
- Extremely accessible and affordable

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

H16: Ability to concentrate (in relation to noise-related disturbances)

How often do you experience noise-related disturbances that affect your ability to concentrate on important tasks?

- Often
- Sometimes
- Rarely
- Very rarely

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

H17: Sleep disturbances

How frequently has your sleep been disturbed by noises or activities outside your home over the past month?

- Often
- Sometimes
- Rarely
- Very rarely

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

H18: Indoor heating and cooling comfort

To what extent are you satisfied with your access to adequate cooling and heating at home, work, and elsewhere to keep you comfortable throughout the day and night?

- Dissatisfied
- Somewhat dissatisfied
- Somewhat satisfied
- Satisfied

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

H19: Workplace safety (Quantitative)

This indicator measures the number of severe workplace injuries reported to the Occupational Safety and Health Administration (OSHA) (i.e., amputation, in-patient hospitalization, or loss of an eye) per 100,000 residents in the past year in your city/town.

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

H20: Asthma prevalence (Quantitative)

This indicator measures the percentage of the population in your city/town who have asthma.

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

H21: Obesity prevalence (Quantitative)

This indicator measures the percentage of the population in your city/town who are obese.

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

H22: Percentage of population with disabilities (Quantitative)

This indicator measures the percentage of the population in your city/town with disabilities (difficulties with hearing, vision, cognitive, ambulatory, self-care, or independent living).

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

Economic Indicators**E1: Household disposable income**

Approximately how much of your combined household income is left after paying taxes and basic household expenses (i.e. mortgage/rent, utilities, insurance, loan and debt payments, food, etc.)?

- 0-10%
- 11-20%
- 21-30%
- 31% or more

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

E2: Ability of household income to meet the basic needs of the household

What statement best describes the state of your current combined household income?

- It does not meet our basic needs
- It meets only our basic needs and does not allow for savings or non-essential spending
- It meets our basic needs and allows for some savings and non-essential spending
- It meets our basic needs and allows for a great deal of savings and non-essential spending

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

E3: Ability to afford unexpected expenses

If you had an unexpected emergency expense of \$400, how much of a burden would it be?

- A large burden
- A moderate burden
- A small burden
- Not a burden

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

E4: Comparative income

How do you think your income level compares to others in your community?

- Much lower
- Slightly lower
- About the same
- Higher

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

E5: Access to financial resources

What types of financial resources are currently available to you? (Check all that apply)

- Savings, cash or physical assets which could be sold
- Credit, loans or equity from physical assets
- Income from employment, endowment or trust fund payments or other regular payments

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

E6: Housing affordability

How affordable do you believe the housing is in your community?

- Not at all affordable
- Somewhat affordable
- Affordable
- Very affordable

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

E7: Health care affordability

To what extent does the health care you can afford meet your health care needs?

- Not at all
- Not very well
- Moderately well
- Fully

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

E8: Access to affordable child care

If you have children under 5 years of age, what statement best describes your access to affordable child care?

- None or insufficient access
- Somewhat insufficient access
- Somewhat sufficient access
- Sufficient access

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

E9: Job satisfaction

In general, how satisfied are you with your current work/employment?

- Dissatisfied
- Somewhat dissatisfied
- Somewhat satisfied
- Satisfied

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

E10: Job security

If you are currently employed, how secure are you in your current work situation in terms of being fired or laid-off?

- Very insecure
- Somewhat insecure
- Somewhat secure
- Very secure

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

E11: Time at work

If you are employed, in the last year, how many hours did you work per week on average?

- More than 80
- 61-80
- 41-60
- 40 hours or less

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

E12: Work/leisure balance

About how many hours did you have for leisure activities (i.e. personal interests, hobbies, relaxation, etc.) outside of work, sleep and regular chores last week?

- 0-4
- 5-9
- 10-14
- 15+

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

E13: Opportunities for advancement

How satisfied are you with opportunities for growth and advancement at your current workplace?

- Dissatisfied
- Somewhat dissatisfied
- Somewhat satisfied
- Satisfied

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

E14: Opportunities for acquiring new information and skills

What statement best describes opportunities available to you for vocational training or other educational programs that could improve your work-related skills?

- No opportunities
- Very few opportunities
- Some opportunities
- Abundant opportunities

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

E15: Household income (Quantitative)

This indicator measures the median household income in your city/town.

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

E16: Job opportunities (Quantitative)

This indicator measures the number of job openings per thousand people (age 16+) in your city or town.

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

E17: Economic growth (Quantitative)

This indicator measures the growth in Gross Domestic Product (GDP) in your city over the past year.

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

E18: Unemployment rate (Quantitative)

This indicator measures the percentage of the population in your city/town that works less than 14 hours per week.

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

E19: Percentage of people living below poverty line (Quantitative)

This indicator measures the percentage of the population living below the poverty line in your city/town.

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

E20: Housing affordability (Quantitative)

This indicator represents the current ratio of median housing value to median household income in your community as an indicator of the housing affordability.

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

E21: Homelessness (Quantitative)

This indicator measures the current number of homeless persons per 10,000 people in your county.

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

E22: Gender gap (Quantitative)

This indicator measures the current average wage earnings for women as a percentage of the average wage earnings of men in your city/town.

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

E23: Percentage of high school graduates (Quantitative)

This indicator measures the percentage of the population in your city/town that has earned a high school diploma or higher degree.

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

Transportation Indicators**T1: Traffic congestion**

How often does traffic congestion inconvenience or bother you as you go about your day-to-day activities?

- Often
- Sometimes
- Rarely
- Almost never

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

T2: Access to transportation

To what extent do you have the means to get where you need to go on a daily basis?

- Not at all
- Very little
- Somewhat
- To a great extent

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

T3: Satisfaction with public transportation

How satisfied are you with your local public transportation options (e.g., local buses, commuter buses, subway, commuter trains, ferry, bike share)?

- Dissatisfied
- Somewhat dissatisfied
- Somewhat satisfied
- Satisfied

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

T4: Transportation system redundancy

If your usual form of transportation were unavailable tomorrow, could you use an alternative mode of transportation to accomplish all of your scheduled tasks?

- Definitely not
- Probably not
- Probably
- Definitely

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

T5: Maintenance of transportation infrastructure

How satisfied are you with maintenance of your local transportation infrastructure (e.g., roads, sidewalks, stations, buses, trains, subways)?

- Dissatisfied
- Somewhat dissatisfied
- Somewhat satisfied
- Satisfied

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

T6: Bicycle and pedestrian routes

How satisfied are you with the connectivity and accessibility of safe routes for biking (e.g., layout of bike lanes, width of roads, availability and location of trails) and walking (e.g., sidewalks, crosswalks) in your community?

- Dissatisfied
- Somewhat Dissatisfied
- Somewhat Satisfied
- Satisfied

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

T7: Access to transportation by vulnerable populations

Compared to everyone else in your community, how much access to transportation (including public transportation, paratransit services, and more) do you think vulnerable populations (e.g., elderly, disabled, low income, non-English-speaking persons) have?

- Much less access
- Slightly less access
- About the same amount of access
- Greater access

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

T8: Satisfaction with nearest airport

How satisfied are you with the products and services provided by your nearest airport (flight destinations, communication regarding flight path changes, getting to and from the airport, etc.)?

- Dissatisfied
- Somewhat dissatisfied
- Somewhat satisfied
- Satisfied

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

T9: Traffic congestion (Quantitative)

This indicator measures traffic congestion in your city/town through travel time index (TTI), which is the time penalty for a trip on an average day (for example, a trip that normally takes 20 minutes would take 26 minutes with a TTI of 1.3 [$20 \times 1.3 = 26$]).

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

T10: Active transportation for commuting (Quantitative)

This indicator measures the percentage of workers (16+) in your city/town that walk or ride a bicycle as their primary means of transportation to work.

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

T11: Public transportation for commuting (Quantitative)

This indicator measures the percentage of workers (16+) in your city/town that use public transportation as their primary means of transportation to work.

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

T12: Vehicle safety (Quantitative)

This indicator measures the number of vehicle traffic fatalities over the past year in your county (including passengers, pedestrians, cyclists and others) per 100,000 residents.

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

Social Relationships Indicators**S1: Feeling of belonging to community**

To what extent do you feel that you are a valued member of your social circles (consider friend groups, neighborhood, online communities in which you are active, spiritual or religious communities, professional associations, and advocacy or volunteer groups)?

- Not valued
- Somewhat valued
- Valued
- Valued to a great extent

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

S2: Social connectedness

How happy are you with your relationships with other people such as family, friends, neighbors, and coworkers?

- Very unhappy
- Somewhat unhappy
- Somewhat happy
- Very happy

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

S3: Connection with neighbors

How often do you have positive interactions with your neighbors, local shopkeepers, etc.?

- Almost never
- Seldom
- Sometimes
- Often

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

S4: Satisfaction with community events

How satisfied are you with the community events (e.g., concerts, plays, cultural fairs, museums, art spaces and galleries, visits to historical locations) in or near your town?

- Dissatisfied
- Somewhat dissatisfied
- Somewhat satisfied
- Satisfied

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

S5: Time off work (weekends, vacations, etc.)

How satisfied are you with the amount of time you have off work, including holidays, weekends, vacation, etc.?

- Dissatisfied
- Somewhat dissatisfied
- Somewhat satisfied
- Satisfied

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

S6: Volunteerism

Within the last year, how often did you volunteer for an organization (e.g., non-profit, church, school, political party, civic organization, club)?

- Not at all
- 1-5 times
- 6-12 times
- More than 12 times

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

S7: Acts of service or assistance

How often do you voluntarily assist others with either small or large tasks or problems?

- Often
- Sometimes
- Rarely
- Almost never

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

S8: Religious or spiritual engagement

To what extent are you engaged in a like-minded community (religious, spiritual, etc.)?

- Not at all
- Very little
- Somewhat
- To a great extent

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

S9: Feeling that most people are trustworthy

Generally speaking, how much do you believe that other people can be trusted?

- Not at all
- Very little
- Somewhat
- To a great extent

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

S10: Resolution of conflicts with others

How easily are you able to resolve conflicts with others?

- Not easily. Conflicts frequently become unfriendly interactions that are stressful.
- With significant effort, but most of the time I find a resolution.
- Somewhat easily. There are personal conflicts in my life, but I'm able to find resolution.
- Easily. I rarely have a personal conflict that I can't resolve in a respectful manner.

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

S11: Experience of discrimination

How often do you feel that you experience discrimination because of your race, ethnicity, gender identity, age, sexual orientation, disability or some other factor?

- Often
- Sometimes
- Rarely
- Almost never

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

Local Governance/Community Services Indicators**G1: Satisfaction with public services**

How satisfied are you with the public services (water, sewer, electricity, telecommunications, waste removal, emergency services, etc.) in your community?

- Dissatisfied
- Somewhat dissatisfied
- Somewhat satisfied
- Satisfied

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

G2: Access to local services

To what extent do you personally have timely access to the local services most important to you (senior centers, youth centers, recreation, police and fire, delivery services, etc.)?

- Not at all
- Very little
- Somewhat
- To a great extent

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

G3: Equitable access to local services

In your opinion, to what extent is access to local services (senior centers, youth centers, recreation, police and fire, delivery services, etc.) in your community equitable (fully available to all community members)?

- Not equitable
- Somewhat inequitable
- Mostly equitable
- Fully equitable

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

G4: Quality of public education system

How would you rate the quality of the public education system in your town?

- 1 - Very low
- 2
- 3
- 4 – Very high

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

G5: Community safety

How safe do you feel in your community?

- Very unsafe
- Somewhat unsafe
- Somewhat safe
- Very safe

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

G6: Emergency notification system(s)

Are you aware of your community's emergency notification system(s), and if so how satisfied are you with the system(s)?

- I am not aware
- I am aware but not satisfied
- I am aware and somewhat satisfied
- I am aware and very satisfied

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

G7: Waste diversion

How satisfied are you with the municipal options available to you for diverting waste from landfills, (i.e. recycling, composting, bulk item removal, electronic waste collection, etc.)?

- Dissatisfied
- Somewhat dissatisfied
- Somewhat satisfied
- Satisfied

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

G8: Availability of services for disabled persons

To what extent do you feel that the services and assistance provided to disabled persons in your community is sufficient?

- Such services and assistance need extensive expansion/upgrades/improvements.
- Such services and assistance require some expansion/upgrades/improvements.
- Such services and assistance are relatively good.
- Such services and assistance are very good.

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

G9: Community resilience

How confident are you that your community is prepared for and can effectively recover from future disasters, both climate related and other (hurricanes, earthquakes, floods, extreme storms, terrorist attacks, fires, etc.)?

- Not at all
- Very little
- Somewhat
- To a great extent

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

G10: Perception that your input matters in government

How important do you feel your input is to your local government?

- Not very important
- A little important
- Moderately important
- Very important

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

G11: Trust in public officials

How would you rate your trust of public officials in your city/town (i.e. elected officials, law enforcement, legal system, etc.)?

- Very low
- Moderately low
- Moderately high
- Very High

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How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

G12: Local commitment to long-term planning

To what extent is your community engaged in long-term planning?

- Not at all
- Very little
- Somewhat
- To a great extent
- I do not know

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

G13: Consideration of vulnerable populations

In your opinion, to what extent is public infrastructure (buildings, transportation infrastructure, signage) in your community designed to accommodate vulnerable populations (elderly, disabled, low income, non-English-speaking persons, etc.)?

- Not at all
- Very little
- Somewhat
- To a great extent

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

G14: Support available to caregivers

If you have children or other people who depend on you for care in your household, how much support (i.e. financial subsidies, family support, social programs, care centers, etc.) is available to you?

- No support
- Very little support
- Some support
- A great deal of support

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

G15: Emergency medical service response time (Quantitative)

This indicator measures the most recent year's average response times (in minutes) for emergency medical service calls in your city/town.

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

G16: Violent crime (Quantitative)

This indicator measures the current annual number of violent crimes reported per 10,000 residents in your city/town.

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

G17: Voter turnout (Quantitative)

This indicator measures the percentage of voters that have participated in elections in your county (average of local and presidential elections) over the past four years.

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

Example Supplemental Indicators and Related Survey Questions

EN_ : Access to parks and natural spaces

How satisfied are you with the accessibility and safety of parks, natural spaces, or green spaces in your community?

- Dissatisfied
- Somewhat dissatisfied
- Somewhat satisfied
- Satisfied

How important is this indicator to quality of life in your community?

- Not very important
- A little important
- Moderately important
- Very important

H_ : Frequency of happy moments

How often do you experience special moments (notable happiness from something such as a child, partner, helping someone, accomplishing something new or difficult) that boost your happiness and may sustain you through more challenging parts of your life?

- Almost never
- Rarely
- Sometimes
- Often

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

H_ : Spirituality or faith (as related to health)

Do you feel as though your spirituality or faith (or lack thereof) positively impacts your physical, mental, or emotional health?

- 1 – Strongly agree
- 2
- 3
- 4 – Strongly disagree

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

T_ : Quality of transportation infrastructure

How satisfied are you with your community's transportation infrastructure (roads, bridges, tunnels, airports, etc.)?

- Dissatisfied
- Somewhat dissatisfied
- Somewhat satisfied
- Satisfied

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

T_ : Transparency in airport planning

How satisfied are you with transparency and communication from your nearest airport concerning financing, planning, and related impacts of airport property development projects?

- Dissatisfied
- Somewhat dissatisfied
- Somewhat satisfied
- Satisfied

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

G_: Storm water runoff infrastructure capacity

Do you feel as though the storm water runoff infrastructure capacity is sufficient in your community (consider frequency of localized flooding, accessibility of roads during a storm event, storm drain capacity, etc.)?

- 1 – Strongly agree
- 2
- 3
- 4 – Strongly disagree

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

G_: Condition of existing public infrastructure

How satisfied are you with state of repair of existing public infrastructure (public buildings, roads, bridges, etc.) in your community?

- Dissatisfied
- Somewhat dissatisfied
- Somewhat satisfied
- Satisfied

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

G_: Trust in law enforcement

How would you rate your trust of law enforcement in your city/town?

- Very low
- Moderately low
- Moderately high
- Very High

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

G_ : Trust in legal system

How would you rate your trust of the legal system?

- Very low
- Moderately low
- Moderately high
- Very high

How important is this indicator to your overall quality of life?

- Not very important
- A little important
- Moderately important
- Very important

Respondent Demographic Information

1. Please provide your zip code:

2. Please select the option that best describes your current housing situation:

- Renter
- Owner
- Subsidized housing
- Living with family or friends (no rent)
- Shelter or other free housing
- Prefer not to say

3. What is your current marital status?

- Single, never married
- Married or domestic partnership
- Widowed
- Divorced
- Separated
- Prefer not to say

4. What is the highest level of education that you have completed?

- No schooling or some schooling (Grade 1 through 11)
- High school graduate, diploma or the equivalent (e.g., GED)
- Some college credit, no degree
- Trade or vocational school, or Associate degree
- Bachelor's degree
- Master's degree or other advanced degree
- Prefer not to say

5. What is your gender identity?

- Male
- Female
- Other/Non-binary/ third gender
- Prefer not to say

6. What is your age?

- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65-74
- 75-84
- 85+
- Prefer not to say

7. Please select the option that best describes your ethnic or racial identity:

- White, non-Hispanic
- Hispanic, Latino, or Spanish origin
- American Indian or Alaskan Native
- Asian
- Native Hawaiian or other Pacific Islander
- Black or African American
- Two or more races
- Prefer not to say

8. Please select the option that best describes your sexual orientation:

- Straight or Heterosexual
- Gay or Lesbian
- Bisexual
- Other
- Prefer not to say

9. Approximately how many miles do you live from your closest commercial service airport?

- 0-2 miles
- 2-5 miles
- 5-10 miles
- 10-15 miles
- 15-20 miles
- 20 + miles

10. Are you a primary caregiver?

- No
- Yes, of dependent minors/children
- Yes, of adult relatives
- Yes, of non-relatives
- Yes, of disabled persons
- Yes, other
- Prefer not to say



A P P E N D I X B

Indicator Thresholds and Quantitative Data Sources

The Excel file can be found at www.trb.org by searching for “ACRP Research Report 221.”



APPENDIX C

Existing Quality of Life Resources

The research team conducted a comprehensive literature review to provide an understanding of existing QOL frameworks and methodologies. The studies summarized in this appendix provide a small sample of the QOL assessment frameworks that were consulted to develop the guidebook, including QOL studies that are more general and those specific to transportation and aviation. Although there are other QOL studies that examine the link between aviation and QOL, many focus on noise as a primary factor or are specific to one airport.

C.1 Quality of Life Resources and Measurement Practices

High-level categories for grouping indicators varied across reviewed studies. However, the most common high-level categories include economic, health, environmental, and social. In general, the reviewed studies lack consistency in defining QOL indicators, with some sources using the term “indicators” and others using the terms “dimensions,” “categories,” or “measures.” The research team adopted the term “indicator” to describe components of QOL, and all relevant indicators from the existing resources were identified and adapted accordingly to fit the needs of this project. Multiple studies included a mix of both quantitative and qualitative indicators, meaning those that can be objectively measured and those that require some subjective input from participants.

Metrics are the specific means of measuring an indicator (e.g., the number of jobs created by a particular project is one metric by which to measure the “employment” indicator). In the reviewed literature, there was significant variation in the metrics examined, and many of the metrics may be too specific for this project to consider. Metrics were considered in order to determine thresholds for the various levels of QOL.

This section further details some resources that influenced the research team’s understanding of QOL and QOL measurement practices.

C.1.1 Organisation for Economic Co-operation and Development Better Life Initiative

The Organisation for Economic Co-operation and Development (OECD) Better Life Initiative provides an index for comparing well-being across countries. This specific report seeks to answer “How’s Life in the United States?” through consideration of the 11 dimensions, or indicators, of “well-being” included in the index. The report compares countrywide “well-being” for the average American to conditions in other OECD countries. It shows relative strengths and weaknesses of each indicator as compared to

other OECD countries. It also identifies well-being priorities and how well-being for each dimension has changed over the past decade on a countrywide basis. It includes information on inequalities as related to income, gender, age, and education, in addition to discussion of the well-being of migrants and governance-related well-being.

C.1.2 World Health Organization Quality of Life Field Test Instruments

The World Health Organization (WHO) takes a holistic approach to assessing QOL, which incorporates both health-related quality of life (HQOL) (i.e., both physical health and mental health) and environmental quality of life (EQOL). The assessment also includes spirituality components. The methodology utilizes surveys administered through field tests to assess QOL. The WHOQOL-100 is a comprehensive 100-question field survey to measure 24 QOL facets or indicators (such as sleep, transportation, home environment), which are categorized under six domains: physical, psychological, level of independence, social relationships, environment, and spirituality/religion/personal beliefs (SRPB). The WHOQOL-BREF is an abbreviated version of the 100-question survey and only consists of 26 questions (one question from each of the 24 facets identified in the WHOQOL-100 research and two additional questions on Overall QOL and General Health). The WHOQOL-SRPB field test instrument covers Spirituality, Religiousness, and Personal beliefs (SRPB) and is an addition to the WHOQOL-100. It is used to measure QOL related to SRPB. The related document, *WHOQOL-SRPB Users Manual: Scoring and Coding for the WHOQOL SRPB Field-Test Instrument*, provides instructions and coding procedures.

C.2 Transportation Related Quality of Life Resources

To understand the connections between airports and various aspects of QOL, we found that the existing literature covered a broad range of topics. Some examples of peer-reviewed studies on the impacts of airports examine influences on the local economy through housing (Nelson 2004, Dekkers and van der Straaten 2008), job markets (Sheard 2014), and the local environment through noise and emissions (Van Praag and Baarsma 2005, Lu and Morrell 2006) and impacts on wildlife (Hauptfleisch 2016). The Sustainable Aviation Guidance Alliance (SAGA) database contains more than 1,000 examples of initiatives that airports have used to improve their economic performance, increase operational efficiency, conserve natural resources, and provide positive social impacts. These examples highlight the diversity of both the influences that airports have on local communities and the complex issues that airport managers work to address.

While limited in number, the transportation- and airport-related QOL studies are both relevant and recent and provide useful background, which the research team will build off as they move forward with the project. These are summarized below:

C.2.1 United Kingdom Airports Commission Quality of Life Assessment

The United Kingdom Airports Commission included QOL impacts as part of its Appraisal Framework, covering 16 modules and created to evaluate three possible airport development schemes for London Heathrow. The Quality of Life assessment was Module 11 out of 16. The project sought to determine QOL indicators affected by aviation and leverages existing UK data sets to assess the effect of aviation on QOL (both positive and negative impacts).

The QOL indicators were derived from elements identified in the UK Measuring National Wellbeing Programme. The scope of the project included identifying QOL impacts from airport development, airport operations, connectivity, and infrastructure associated with the airport. The research examined the effect of aviation on QOL using “subjective wellbeing analysis.” The researchers used regression analysis to examine two large existing data sets in order to assess both the effects of *living* near airports and the effects of *being* near airports. While the study concluded that living near airports does not have an effect on overall well-being of community members, exposure to certain levels of aircraft noise does have a negative impact: “living within a daytime aircraft noise contour (over 55 dB) is negatively associated with all subjective well-being measures” (PricewaterhouseCoopers 2015). The study suggests strategies for airport developers to consider in order to mitigate negative impacts of the airport on QOL and to enhance the positive impacts associated with airport construction and operations.

C.2.2 Western Sydney Airport Health Impact Assessment

In 2016, the Australian Minister for Urban Infrastructure approved final plans for the development of a new airport in Western Sydney. As part of the overall environmental assessment, the Centre for Health Equity Training, Research, and Evaluation, Centre for Primary Health Care and Equity at University of New South Wales, Australia, conducted a health impact assessment for the Western Sydney International Airport community engagement process (Hirono et al. 2017). The project explores how the level of stakeholder engagement and participation in decision making affect health and well-being of community members. The objective of the study was to examine how community engagement in airport planning initiatives affects indicators of community and individual well-being.

Findings demonstrate that affected community members are dissatisfied with the level of community engagement associated with the development of the airport. The study reports that the impacts of the current level of engagement are negatively affecting several well-being indicators, including “access to information, feeling of control, participation, and risk perception.” The study notes the importance of a thoughtful and considerate approach to community engagement by the airport developer and includes recommended strategies for engagement.

C.2.3 Minnesota Department of Transportation Quality of Life Study

In 2013, the Minnesota Department of Transportation (Minnesota DOT) published a report examining how transportation affects QOL, specifically in the state of Minnesota for Minnesota DOT infrastructure and facilities. The study methodology included focus group interviews and a mailed questionnaire. Researchers Ingrid E. Schneider, Tian Guo, and Sierra Schroeder (2013) identified 11 QOL factors as reported by stakeholders (i.e., focus group and survey participants). The report focused on identifying measures that influence satisfaction with Minnesota DOT services. The study identified seven transportation indicators and found that most participants rated transportation as important to overall QOL. While not specific to aviation, the findings confirm that access to transportation significantly affects people’s ability to fulfill their needs by expanding access to employment, education, and recreational activities, among other effects.

C.2.4 Frankfurt Airport Noise and Quality of Life Study

A roundtable of stakeholders was formed in response to future development and expansion at Frankfurt Airport in Germany, specifically concerning construction of a new runway. The roundtable commissioned a field study to assess residents' reaction to aircraft noise. The study sought to assess aircraft noise annoyance and disturbances due to aircraft noise in order to determine whether aircraft noise had any effect on EQOL and HQOL in a regional context.

The study included in-person interviews with 2,312 residents who live within 40-kilometers of Frankfurt Airport and who represent 66 communities. Survey questions addressed each resident's satisfaction with their residence, self-assessment of aircraft noise annoyance and disturbance, and other EQOL and HQOL components, such as health complaints, sleep quality, and individual noise sensitivity. It also captured information concerning the resident's attitude toward aircraft and the airport in general. Aircraft, road traffic, and railway noise exposure for each resident was determined based on each participant's address. The participants' gender, age, and socioeconomic status were also captured. The study analyzes the relation of noise impacts on health variables.

Results of the study indicate that equivalent sound level is the strongest aircraft noise exposure metric for capturing the aircraft noise exposure–annoyance relationship. The study found that HQOL indicators are impacted by both aircraft noise annoyance, as well as individual noise sensitivity. It also shows that stress related to aircraft noise decreases satisfaction with residential areas and decreases perceived EQOL. The study concludes that future research should include longitudinal studies to better determine if a causal noise–health relationship exists.

C.2.5 Berlin Airport Noise Quality of Life Study

This technical report focused on examining the effects of aircraft noise on a sample of elderly residents in Berlin through cross-sectional analyses of data derived from the Berlin Aging Study II, which focuses on the determinants of successful aging. The data is not representative of the Berlin population with regard to geographical distribution or age demographics. However, the research team was able to analyze effects of aircraft noise on subjective well-being and health of participants because the study includes questions about whether participants live in an area affected by noise and—more specifically— if they are disturbed by aircraft noise. The research team compared respondents who self-reported as either being affected or non-affected by aircraft noise by comparing how they rated their satisfaction with various factors of quality of life, such as sleep satisfaction, healthy eating, and depression.

The report addresses the methodological challenges of analyzing the impacts of aircraft noise on residential areas. It addresses researchers' need to make certain assumptions while analyzing the data and statistically controlling for various demographic data points, such as marital status, employment status, and education. The report also addresses the limitations of cross-sectional analyses and the inability to determine causal findings as a result of them. As a result, the researchers determined that aircraft noise was associated with reduced well-being and impaired health for affected residents. They stress that these conclusions can only be made for the non-representative, primarily elderly, residents of Berlin that responded to the original study survey.

C.3 Other Quality of Life–Related Studies

The literature review also identified several sources that address airports and their impact on health-related QOL indicators, though several of these were quite specific and only examined one indicator. These include studies researching the impact of aviation noise on cardiovascular hospitalizations (Correia et al. 2013) and the health impacts of air pollution associated with aviation (Levy et al. 2015), for example. There are also examples of peer-reviewed studies on the impacts of airports on the local economy through housing (Nelson 2004, Dekkers and van der Straaten 2008), job markets (Sheard 2014) and the local environment through noise and emissions (Van Praag and Baarsma 2005, Lu and Morrell 2006), and impacts on wildlife (Hauptfleisch 2016).

With guidance from case studies and literature on mixed-methods, multicriteria approaches, the methodology described in Chapter 3 and in Appendix D is an indicator-based approach that uses a combination of detailed quantitative data sets—when available—and qualitative data collected via survey from community members. This mixed-methods approach will introduce more possibilities for analysis and interpretation than a strictly quantitative analysis. Most importantly, little data is available on some of the most important aspects of QOL, particularly in the social relationship category, and an assessment based exclusively on quantitative data would not be robust.



APPENDIX D

Process for Developing Quality of Life Assessment Methodology

The following appendix provides a more detailed record of how the Quality of Life Assessment Methodology was developed. Chapter 2 of the guidebook provides an overview and explanation of the Quality of Life Assessment Methodology, including a description of the quantitative and qualitative indicators, the QOL scoring mechanism, and the process of importance weighting. The information in this appendix provides additional detail and context describing the development of the methodology by the research team.

As noted in Chapter 2, the Quality of Life Assessment Methodology developed for this guidebook was based primarily on a similar tool developed by ERG for evaluating resilience of communities to the impacts of climate change created for the EPA (Blue et al. 2017). The EPA tool is known as the Multi-Sector Evaluation Tool for identifying Resilience Opportunities, or METRO. Most of the indicators developed for the Quality of Life Assessment Methodology are different than those developed for the resilience assessment tool. However, the overall methodology is similar, and some of the relevant indicators were retained. Indicators related to QOL, sustainability, and resilience are often related to each other.

Robust methods of measuring QOL can help governments and other interested parties, such as airports, understand livability issues and both positive and negative outcomes of changes or planned changes in a community. Some attempts to measure QOL rely mainly on economic or demographic metrics (i.e., hard data), while others rely on subjective, perception-based measurements (Haslauer et al. 2014). One difficulty in creating a useful assessment of QOL lies in the wide variety of factors that affect overall QOL and the challenges related to broadly measuring, interpreting, and integrating metrics.

Some factors affecting QOL in a community—such as economic health, air quality, and water quality—can be measured quantitatively through publicly available data sets. Other factors are not reflected in this type of available data and are best addressed by asking community members for input on issues that are important to them, as well as how important they are and how the issue is currently affecting their QOL. For this project, the research team selected a mixed-methods approach (i.e., one that incorporates both hard data, when it is available, and qualitative information collected from community members to address QOL more comprehensively) to assessing QOL in communities surrounding airports. This was the same approach used in the EPA resilience assessment tool previously discussed.

A mixed-methods approach that integrates both quantitative and qualitative information increases understanding of the broad influence that airports have on local communities and can support airport

leaders in making decisions that are beneficial to local QOL. Perhaps even more importantly, involvement in assessing the QOL in the local community demonstrates to communities that the airport is aware of and considerate of its effects on its neighbors. This can help foster improved relationships between airports and communities.

With guidance from case studies and literature on mixed-methods, multicriteria approaches, the research team revised and adapted METRO's indicator-based approach using a combination of detailed quantitative data sets, where available, and qualitative data related to subjective aspects of QOL collected via survey from community stakeholders and airport personnel. This mixed-methods approach will introduce more possibilities for analysis and interpretation than a strictly quantitative analysis. Most importantly, little data is available on some of the most important aspects of QOL, particularly those in the social relationship category, and an assessment based exclusively on quantitative data would not be robust.

D.1 Quantitative and Qualitative Indicators

The Quality of Life Assessment Methodology is based in part on well-vetted decision-support methods known as multicriteria analysis or multicriteria assessment (MCA) and mixed-methods evaluations. MCA methods evaluate decision alternatives based on multiple criteria or objectives (Hajkowitz and Higgins 2008). MCA studies typically involve participant engagement to collect input on preferences that is often converted to quantitative data. Mixed-methods evaluations incorporate quantitative information (i.e., hard data) in addition to qualitative information collected via MCA methods or other means.

The list of 100 indicators selected for evaluating QOL under this methodology is a mix of quantitative and qualitative indicators. For the quantitative indicators, existing data sets are used to score QOL. Input from tool users is still needed to score the importance of that indicator to the overall assessment. For the qualitative indicators, tool users must answer questions to determine a QOL score for the indicator (essentially, ranking QOL on a scale from 1 to 4 with respect to the issue represented by the indicator), in addition to providing an importance score for the issue represented by the indicator (reflecting the indicator's relative importance in the overall QOL assessment).

D.2 Selection of Indicators

The research team's goal during the indicator selection process was to identify a set of indicators that would—when applied to an assessment of QOL in any community surrounding an airport in the United States—provide a reasonably accurate and comprehensive measure of all aspects affecting the QOL of all members of the community. The team balanced the degree to which a large number of indicators would provide more specific information on the largest number of community members with the degree to which a small number of indicators would provide an efficient means of conducting such an assessment. The indicators had to be general enough that a reasonably small number of them could capture major factors affecting QOL but specific enough that they would be meaningful and there would be consistency in how they are interpreted and scored by various communities.

Similar high-level indicator categories—including economic, health, environmental, and social categories—were identified in many of the resources reviewed during the literature review process. To

reflect the research team's findings during the literature review process, the final Quality of Life Assessment Methodology includes six categories of indicators: Environmental, Health, Economic, Transportation, Social Relationships, and Local Governance–Community Services. The research team used the term “social relationships” to reflect the social category (as it best reflected the set of individual indicators that were selected) and added local governance–community services and transportation categories to categorize additional indicators related to ensure a holistic assessment methodology in relation to measuring QOL in communities surrounding airports.

The transportation category was of great interest to the research team, given that this tool is intended to be used in part to inform airport leaders regarding issues that are important to the surrounding communities, which will ultimately inform decisions the airport may make that will affect community QOL. The tool is robust enough that—although it is intended to be used by airports—it can also be implemented by other local organizations interested in obtaining information concerning community QOL.

The research team identified more than 400 QOL indicators from the literature. These were narrowed down to 100 indicators of greatest relevance to this study. The research team removed redundant indicators and those deemed to be insignificant to the general assessment methodology (compared with remaining indicators). Each of the 100 indicators in the Quality of Life Assessment Methodology was then organized into one of the following six categories. Indicator titles were revised as necessary to reflect the subcategory of the QOL assessment it was intended to cover. The following list indicates the number of indicators (including both qualitative and quantitative indicators) that reside within each of the tool's high-level QOL categories:

- Environmental (14 indicators)
- Health (22 indicators)
- Economic (23 indicators)
- Transportation (12 indicators)
- Social Relationships (11 indicators)
- Local Governance–Community Services (17 indicators)

The number of indicators within each category is not a reflection of the importance of the category in assessing QOL. Rather, for some categories it was possible to cover the main topics of interest using a smaller number of indicators, while for other categories the diversity of QOL topics covered within the category required a larger number of indicators to capture QOL. In addition to the indicator categories listed above, a general indicator on overall QOL was included in the assessment methodology that does not fall into a category.

Data related to many QOL indicators are not available in existing data sets describing communities surrounding airports (or any community, for that matter). Therefore, most of the indicators selected are qualitative. The qualitative indicators are framed as questions administered to the assessment participants through a survey, and there is some subjectivity expected in the answers to be provided

during the assessment. Regardless, the research team believes that the wealth of information that community members have about what influences their own QOL is better captured by using a full range of qualitative indicators than by limiting the assessment to information that could be gleaned from the narrower set of relevant quantitative indicators. Table 1 in Chapter 2 includes information on which indicators are quantitative and which are qualitative. Information on how data can be gathered for these indicators is described in Chapter 4.

D.2.1 Supplemental Indicators

The Quality of Life Assessment Methodology is designed to provide flexibility to meet the needs of unique airports. Collecting data for all 100 indicators is suggested under the Quality of Life Assessment Methodology (described in Chapter 3) in order to conduct a comprehensive study of community QOL, but the methodology allows for some flexibility when choosing indicators by allowing the list to be altered by individual airports to best meet their needs when completing the assessment. As discussed in this guidebook, the primary set of 100 indicators was developed based on input from subject matter experts, airport personnel, the ACRP project panel (an advisory panel of technical industry experts), and community stakeholders at three partner airports. However, local conditions will vary from airport to airport, and if the airport or stakeholders identify significant information gaps in the provided list of indicators, the airport can use some customized, supplemental indicators in order to make the QOL assessment more locally relevant.

The supplemental indicator list in Appendix B contains example indicators that can be added to the survey tool or used to replace indicators already in the survey tool; for example, if the data does not exist for all the quantitative indicators recommended or if an existing indicator is not applicable to a certain airport. Airports are free to develop additional qualitative or quantitative indicators to address specific issues of importance to them or their stakeholders beyond those examples that exist in the current list of supplemental indicators.

The research team advises that supplemental indicators be added to a QOL assessment judiciously. The addition of too many custom supplemental indicators may jeopardize the ability of a QOL assessment to capture information under the six categories of QOL, as identified by the research team and validated through the research process. Thus, the research team recommends that supplemental indicators be used sparingly unless an airport's situation diverges significantly from those of most U.S. airports for a particular reason. It is also acceptable to use the original list of 100 indicators without making any modifications. Either approach will lead to a valuable assessment of community QOL to inform future decision making and improve understanding between the airport and the surrounding community.

D.3 Indicator Quality of Life Scoring Mechanism

As described in Chapter 2, each qualitative and quantitative indicator was assigned scores of 1 to 4 corresponding to responses representing low to high QOL. Additional details follow.

Quantitative Indicators

For the quantitative indicators presented in Table 1, QOL scores ranging from 1 to 4 were assigned by dividing data into four categories of values separated by three threshold indicator values. Indicator thresholds were identified to represent the points at which an indicator value likely changes from one

representing poor QOL (an indicator score equal to 1) to a fair QOL (an indicator score equal to 2), for example. To illustrate this concept, imagine a scenario in which data were collected from the U.S. Census Bureau for Indicator E19 (the percentage of people living below the poverty line). For this indicator, a QOL score is assigned using the indicator's unique thresholds as follows:

- A QOL score of 1 is assigned to communities where 20 percent or more of the population live below the poverty line.
- A QOL score of 2 is assigned to communities where 16 percent to less than 20 percent of the population live below the poverty line.
- A QOL score of 3 is assigned to communities where 12 percent to less than 16 percent of the population live below the poverty line.
- A QOL score of 4 is assigned to communities where less than 12 percent of the population live below the poverty line.

Due to the complex processes represented by each quantitative indicator and the variable ways in which each indicator can influence overall QOL, indicator thresholds can be somewhat challenging to assign; especially when the goal is to have them represent all U.S. cities. As such, and to the extent possible, the thresholds used in this assessment were based primarily on validated indicators developed to support similar assessment tools or information gleaned from the peer-reviewed literature. For example, the thresholds for Indicator G15 (emergency medical service response time) and Indicator E17 (economic growth) are based on those previously developed by Julie Blue, Nupur Hiremath, Carolyn Gillette, and Susan Julius and published in EPA's *Evaluating Urban Resilience to Climate Change: A Multi-Sector Approach* (Blue et al. 2017). Even though the primary purpose of that tool is to evaluate resilience of communities to the impacts of climate change, the research team reviewed the technical approach and concluded that the thresholds used to evaluate quantitative data for that purpose are equally relevant and appropriate when measuring QOL.

When indicator thresholds were not readily available in the peer-reviewed literature or other sources, publicly available data for U.S. cities were examined to establish a range of values for the indicator across the U.S. For these indicators, the median value from within the data distribution was often selected as a starting point for identifying the value for a middle threshold (i.e., separating a QOL score of 2 from a QOL score of 3), with high and low values based on natural upper or lower limits in the data. Recognizing that the distribution alone is not enough for defining absolute thresholds for important QOL issues, the research team consulted the published literature (e.g., academic literature and government reports) to calibrate the initial thresholds, based exclusively on the data. As an example, Indicator H21 (obesity prevalence) is based largely on data maintained by the Centers for Disease Control and Prevention. However, since obesity is considered a national epidemic, indicator thresholds based solely on the distribution of prevalence estimates may not appropriately reflect QOL. For indicators such as this, the thresholds identified from the data were adjusted upwards or downwards to reflect information gathered from other sources. In the example of obesity prevalence, the research team adjusted the thresholds downwards based on findings published in various public health resources.

Qualitative Indicators

For qualitative indicators, QOL scores ranging from 1 to 4 were assigned to each response to the indicator question. As described earlier, qualitative indicators are represented by a question with a

defined set of four responses. For example, Indicator EN1 (satisfaction with local air and water quality) asks an individual to respond to “How satisfied are you with air and water quality in your community?” by selecting one of the following responses: “dissatisfied,” “somewhat dissatisfied,” “somewhat satisfied,” or “satisfied.” In this case, QOL scores are assigned as follows:

- A QOL score of 1 is assigned for a response of “dissatisfied.”
- A QOL score of 2 is assigned for a response of “somewhat dissatisfied.”
- A QOL score of 3 is assigned for a response of “somewhat satisfied.”
- A QOL score of 4 is assigned for a response of “satisfied.”

As with the scoring mechanism described above for the quantitative indicators, there can be challenges when assigning QOL scores to the qualitative indicator responses. As such, several members of the research team independently assigned QOL scores to each response for each qualitative indicator. These scores were then compared, and any discrepancies were discussed and reconciled with the larger research team.

D.4 Indicator Weighting Mechanism

An important part of the Quality of Life Assessment Methodology includes prioritizing which indicators contribute the most to QOL or detract the most from QOL. As noted previously, for each of the 100 indicators, the QOL score shows how an individual community member is faring (or, collectively, how the community is faring) with relation to the component represented by that QOL indicator (i.e., high QOL is represented by a QOL score equal to 4, and a low QOL is represented by a QOL score equal to 1 for the specific indicator). However, the importance of one indicator is unlikely to be equivalent to the importance of all the other indicators in assessment of QOL, so it is not advisable to weight each indicator equally in the assessment. Some indicators may be very important to overall QOL, and some indicators may be minor in terms of how they affect overall QOL for an individual (regardless of whether the QOL score is high or low for that indicator). For this reason, the methodology uses the calculation of importance scores to reflect the degree to which an indicator contributes to overall QOL so that each indicator is not weighted equally.

Importance scores vary from 1 to 4 (an importance score equal to 1 represents low importance for an indicator with respect to a respondent’s overall QOL, and a 4 represents high importance). Importance scores for each indicator are captured using the Quality of Life Assessment Survey Tool (Appendix A). For example, the research team anticipates that many participants may rank Indicator H1 (personal satisfaction with health) with an importance score of 4 (high importance), since it is universally applicable and poor health has the ability to affect most aspects of an individual’s life. However, an indicator such as T4 (transportation system redundancy) may receive a lower importance score. Some participants may believe low redundancy in the public transportation system is unlikely to affect their QOL significantly if they have access to a reliable personal vehicle. Other individuals may rank Indicator T4 with a higher importance score if they are dependent on public transportation for commuting to work or school or live in areas where the transportation system is unreliable due to scheduling, weather, or recurring maintenance problems.

D.5 Quadrant Plots

As described and presented in Chapter 5, results for qualitative and quantitative indicators can be presented in a quadrant plot, with importance scores on one axis and QOL scores on the other. These plots allow users to quickly identify QOL issues that need to be addressed or monitored for changes over time. As also mentioned in that same section, quadrant charts can be used to visualize results for a single participant but are far more useful when results are plotted for a group of individuals. When quadrant plots are used in this way, QOL scores and importance scores must be averaged across participants so that a single score for each can be plotted for each of the indicators.

Chapter 5 presents example quadrant plots using simple averages to obtain a single QOL score for each of the qualitative indicators and a single importance score for each of the qualitative and quantitative indicators. These values were then rounded to the nearest whole number to determine which quadrant each indicator falls within. While this approach offers an easy and quick way to visualize the data, it has the potential to dilute or mask QOL issues (i.e., indicators with a low QOL score or indicators with a high importance score). This could result in implicitly optimistic assessments of QOL, potentially overlooking important QOL issues simply because low QOL scores or high importance scores were averaged out. This can also occur if rounding of average QOL scores or importance scores moves an indicator from one quadrant to another (e.g., from the “monitor for changes” quadrant to the “low priority” quadrant).

To address this concern, various advanced statistical approaches are available that would allow the upper and lower bounds of the range of possible QOL scores or importance scores to be more heavily weighted in the average estimate (Runfola et al. 2017). Simply put, this means that instead of all data points contributing equally to the final average QOL score, certain data points (i.e., QOL scores of 1 or importance scores of 4) would contribute more than others. This conservative approach would help to ensure that important QOL issues are not overlooked due to traditional average and rounding conventions. However, these alternative approaches require additional resources and, ideally, guidance by an expert statistician.

In lieu of these advanced statistical methods, airports can remain aware of the potential limitations associated with using a simple average to plot QOL scores and importance scores for a community. Additional insight can be gained by reviewing the distribution of individual responses. Refer to Appendix G for more information.

D.6 Refinement of Methodology

To ensure that the Quality of Life Assessment Methodology is usable by airports and results in meaningful data to determine a community’s overall QOL, the approach was reviewed with three partner airports. This collaboration consisted of convening a small group of airport personnel and external community stakeholders from each airport to discuss and refine the indicator list and the survey process.

Three airports volunteered to participate in the methodology refinement process: Dallas–Fort Worth International Airport, Tampa International Airport, and Portland International Jetport (Portland, Maine). Appendix E contains summaries of the information obtained from the three airport workshops. The methodology refinement process involved outreach through teleconferences and webinars to airport

staff and, later, the external community stakeholders, culminating in in-person workshops at each of the airports.

The research team worked with the main contact for each partner airport to identify and convene the group of volunteer stakeholders for each workshop. One objective of the workshops was to review and discuss all the qualitative indicators in a collaborative group setting. During the three workshops, participants engaged in discussions concerning the ability of the methodology to capture critical information for a holistic QOL assessment, including input on the weighting process for indicators and suggestions for refinements to the assessment tool (i.e., revised indicators and addition or removal of indicators). Participants had the opportunity to evaluate the appropriateness and scope of the proposed qualitative QOL indicators in both small and large group settings.

D.6.1 Engagement with Partner Airports

Internal airport stakeholders included a variety of representatives from across the airports, such as executive leadership, operations staff, environmental staff (including noise and sustainability-focused staff), communications and marketing staff, and government affairs representatives. Introductory calls, including an introduction to ACRP, provided background information; the purpose and objective of the research project; research approach; draft Quality of Life Assessment Methodology; project schedule; and anticipated final analyses. The introductory calls served to engage airport staff. The three airports requested follow-up teleconferences with additional airport staff to clarify the research process and airport responsibilities and address any concerns about the workshops prior to inviting external stakeholders.

The partner airports were asked to identify external stakeholders to include in the workshops and to initiate outreach. To ensure consistency and clarity, the research team drafted outreach emails for the airport points of contact, as well as prepared a package of background information for participants. The outreach email introduced the research team to the external stakeholders, and further communications were sent directly from the research team.

To allow for as much time as possible during the workshops for stakeholder discussions, the research team scheduled introductory web-enabled teleconferences for the external stakeholders approximately 2 weeks in advance of the workshops. The purpose of the calls was to introduce the project and research team members to stakeholders, discuss the research and the workshop objectives, and review workshop logistics. As noted previously, participants were also provided with a read-ahead document describing the project and objectives of the research, workshop logistics, an overview of the methodology, and instructions for participation. The read-ahead packet also included the draft survey instrument for collecting data on the qualitative indicators. However, the participants were instructed not to fill out the survey. Participants were asked to review the packet prior to the introductory calls and the workshop. Although much of this process is specific to the step of refining the research methodology, similar preliminary web-enabled teleconferences and introductory information can be used when conducting a full QOL assessment.

D.6.2 Workshop Overview

The three in-person workshops were each a half day and included both large group and small group discussions facilitated by members of the research team. The stakeholders were given adequate time and opportunities to voice their opinions and provide feedback on the project in the workshop, as well as in a follow-up survey to the workshop. Further details concerning input obtained during each workshop are provided in Appendix E.

D.6.3 Collecting Input on Quantitative Indicators

Quantitative indicators were not the primary subject of discussion at the workshops because the methodology requires that airport personnel (or a contracted third party) gather data on the quantitative indicators from publicly available data sets during the QOL assessment process. To obtain airport stakeholder input and review during the research process, quantitative indicators and suggested data sources for each were shared with the three airports. The airport personnel were asked to share the draft quantitative indicators with colleagues to obtain feedback from various airport departments, although they were not tasked with collecting the data.

The research team scheduled discussions with airport stakeholders to obtain feedback on the quantitative indicators after the in-person workshops. Airports were also asked to provide input related to the following items:

- Feedback concerning whether the airport already collects any of the data contained in the list of quantitative indicators and, if so, for what purposes;
- Feasibility of gathering the data that is not already collected for other airport purposes;
- Any foreseen quantitative data gaps;
- Feedback concerning whether the data sources that the research team identified are accessible or reasonable for data collection by airport staff;
- Clarity of indicator descriptions;
- Relative importance of each indicator to overall QOL in their airport and community perspective as a whole; and
- Feedback concerning whether the level of effort estimated to gather information regarding each indicator is accurate.

The research team incorporated feedback concerning specific indicators and importance scores in the final list of indicators presented in Appendix B of this guidebook, as appropriate after further evaluation of feedback by the research team. Multiple airport participants suggested that it may be more efficient to obtain data sources related to the quantitative indicators by contacting city departments as opposed to the originally identified national data sets. They noted that many cities or local governments regularly collect and analyze data on a local level for their own purposes, specifically many of the economic quantitative indicators. Some participants felt that it may be more realistic and efficient to contact and work with local entities to ensure the assessment captures the most up-to-date local data in their communities. Airport participants also mentioned that some of these indicators have been considered during airport master planning efforts and would not require much additional analysis to include. Discussions also focused on how community perspectives and expectations have shifted over time, and,

therefore, it is increasingly valuable for airports to track and collect data related to many of the QOL indicators that the airport previously may not have considered.

D.6.4 Collecting Input on Qualitative Indicators

Qualitative indicators were the main subject of discussion at the workshops because the methodology suggests using a participant survey to gather this information. The research team sought stakeholder input on the applicability and appropriateness of the qualitative indicators. During the workshop, participants were separated into small groups to discuss specific categories of indicators and provide feedback to the research team.

Small group discussions were facilitated by research team members but were designed to provide a forum where every stakeholder felt comfortable providing input. Feedback from the workshops included suggestions to add or remove indicators, revisions to the language of indicators, switching the order of questions on the survey, and more. The outcome from these discussions—along with the feedback from airports on the quantitative indicators—formed the basis for revisions to the methodology.

D.6.5 Potential Concerns Regarding Collection of Sensitive Information

Development and administration of a QOL assessment can be a cause for concern because the survey instrument facilitates the collection of potentially sensitive information. The qualitative indicator survey asks respondents for their personal opinions on a range of topics and includes optional demographic questions that may help the airport analyze and better understand evaluation results. The research team is aware of the sensitivities of the research and sought to maintain a transparent and collaborative relationship with both internal and external airport partners throughout the research process and the workshops.

A few examples of concerns identified by the internal airport stakeholders include legal concerns about data privacy, political concerns associated with obtaining data that may further illustrate disparities among community populations, and airport concerns that some stakeholder groups may intentionally have their members provide biased responses in an attempt to influence airport operations. Partner airports also expressed concerns that holding a workshop could provide a forum for stakeholders with preexisting complaints about or disputes with the airport to bias the evaluation process.

The research team received feedback from airport personnel that many airports interested in undertaking a QOL assessment would likely prefer to initially undertake a streamlined version of the assessment to demonstrate value to internal stakeholders before embarking on a full QOL assessment. The rationale is that once the resulting QOL data is recognized as reliable and important, the allocation of financial and human resources for a full QOL assessment could be more easily justified.

Airports also recognized that partnerships with local governments, associations, or local universities may provide another avenue for funding a full QOL assessment as the outcomes would be of interest to these organizations. In addition to providing potential funding, another benefit of partnering with outside organizations is that the study might be viewed as more legitimate by communities if it is not undertaken solely by the airport.



APPENDIX E

Airport Workshop Summaries

As part of this project, the research team conducted in-person workshops with three partner airports in order to gather input on the Quality of Life Assessment Methodology overall, as well as the qualitative and quantitative indicators included in the approach. These workshops were critical to ensure that the QOL assessment process is sufficiently robust and flexible to meet the needs of airports and their stakeholders. Input gathered from the workshop participants (including internal airport and external community member stakeholders) was used to refine the methodology and the draft list of indicators. This appendix provides a brief summary of each workshop.

E.1 Purpose and Objectives of Workshops

Three partner airports—including Dallas–Fort Worth International Airport, Tampa International Airport, and Portland International Jetport—volunteered to assist the research team by hosting half-day workshops with internal and external stakeholders to critically review and discuss the Quality of Life Assessment Methodology. Workshops were held during the summer of 2019, with all discussions facilitated by members of the research team.

Key contacts at the airports worked with the research team to identify and convene a group of volunteer stakeholders for each workshop. The objective of these workshops was not to conduct a QOL assessment for the airport and its surrounding communities but, rather, to gather input on the proposed Quality of Life Assessment Methodology for refinement.

During each workshop, participants had the opportunity to discuss the appropriateness and scope of the proposed qualitative QOL indicators in both small and large group settings. They also engaged in discussions concerning the ability of the methodology to capture critical information for a holistic QOL assessment. They considered the ability of the weighting process to account for the importance of each indicator and provided suggestions for how to refine the tool (e.g., revising existing indicators and adding new indicators).

Each workshop included the following:

- An overview of the project objective,
- Discussion of the airport in the context of the community,
- Introductions by the participants and the research team,
- Discussion of each participant’s views on critical components of quality of life and priorities,

- Overview and discussion of the draft assessment methodology,
- Small group discussions on a subset of the qualitative indicators,
- Discussion on the appropriateness of the selected indicators and any data gaps,
- Discussion of potential approaches to encouraging collaboration between the airport and community in applying the methodology, and
- Exchange of ideas concerning the resulting data and what stories it could tell.

The following sections present a high-level summary of each workshop.

E.2 Dallas–Fort Worth International Airport Workshop

The workshop at Dallas–Fort Worth International Airport was held on Monday, June 24, 2019. Research team members who attended in person included Katherine Preston (HMMH), Julie Blue (ERG), Rebecca DeVries (ERG), and Jim Crites. Key contacts for the airport included environmental program managers and community engagement and external affairs professionals. Over 30 external stakeholders from surrounding communities and organizations were invited to participate in the workshop, including the following (stakeholders with asterisks attended the workshop):

- North Central Texas Council of Governments*
- City of Arlington
- City of Coppell*
- City of Euless
- City of Grand Prairie
- City of Grapevine
- City of Irving
- City of Lewisville
- City of Southlake
- Town of Flower Mound*
- Town of Trophy Club
- Town of Westlake

As previously mentioned, participants were asked to reflect on what QOL means to them and their community before providing input on the Quality of Life Assessment Methodology. Figure E-1 presents a word cloud illustrating key words that were mentioned when describing QOL from each participant’s perspective. In this figure, the size of each word indicates the frequency with which a specific word was mentioned during the opening roundtable discussion. Words that appear in a larger font represent those mentioned with a greater frequency (e.g., safety, public transportation, and community engagement) than those appearing in a smaller font (e.g., population growth, amenities, and air quality).

Feedback on Qualitative Indicators

- The workshop participants provided input on all the qualitative indicators during the meeting. This input was combined with the input of the other two airport workshops to revise the methodology and indicator list.

Feedback on Demographic Questions

- Participants noted that demographic information may be problematic for some individuals to share and suggested that survey respondents be allowed to skip any question that they are not comfortable answering.

General Comments/Considerations

- Participants noted that data collection should probably be conducted by a third party to ensure data security.
- Participants discussed how the relationship between the community and the airport, including stakeholder perceptions of the airport, are influenced by a variety of factors. If someone does not use the airport and has a negative view of it, there is additional opportunity for engagement to inform them of the indirect positive impacts that the airport may have on them. Broadly speaking, the airport has a great interest in determining what the public cares about and how this can inform their actions.
- Participants mentioned several potential end uses of the QOL assessment results, such as helping the airport to identify priorities in the community, developing more relevant reports, and better engaging with the local community. The results can also help “tell a story” in their Annual Social Governance Report with a better understanding of community concerns and interests.
- Airports can use this information to understand the desires of the community, improve or positively impact critical issues of the community, and avoid unintentional negative impacts of airport actions on the community.

E.3 Tampa International Airport

The workshop at Tampa International Airport (TPA) was held on Tuesday, June 25, 2019. Research team members who attended in person included Katherine Preston (HMMH), Julie Blue (ERG), and Rebecca DeVries (ERG). The primary contact for the airport was the sustainability and wellness manager. Other airport staff who assisted in the organization of the workshop included communications, human resources and government affairs staff. Close to 30 external stakeholders from surrounding communities and organizations were invited to participate in the workshop, including representatives of the following (stakeholders with asterisks participated in the workshop):

- City of Tampa, Economic and Urban Development Department*
- Tampa Chamber of Commerce
- Clearwater Chamber of Commerce
- St. Petersburg Chamber of Commerce
- Hillsborough Area Regional Transit
- Tampa Hillsborough Expressway Authority
- Pinellas Suncoast Transit Authority
- Tampa Bay Area Regional Transportation Authority

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- Florida Dept. of Transportation District 7
- Dana Shores Civic Association*
- Carrollwood neighborhood
- Sunset Park Homeowners Association*
- Beach Park neighborhood
- Drew Park Community Redevelopment Area
- Tampa Homeowners: An Association of Neighborhoods
- Pinellas County Administrator
- Hillsborough Metropolitan Planning Organization (MPO)*
- Hillsborough County Economic Development Corporation (EDC)
- Pinellas County Economic Development*
- Hillsborough County Administrator
- Hillsborough County MPO and Planning Commission*
- Hillsborough County Schools
- University of South Florida
- Tampa Downtown Partnership
- Hillsborough Community College
- University of Tampa
- WestShore Alliance
- Visit St. Pete/Clearwater
- Tampa Bay Partnership
- Visit Tampa Bay

As previously described, the half-day workshop began with an introduction to the project, roundtable introductions and discussion of what QOL means to each participant, and a brief presentation from airport personnel covering background of the airport and, in this case, introducing the airport's sustainability program. They noted recent initiatives in TPA's sustainability program, which are expanding to emphasize the social and economic sides of sustainability, as well. Figure E-2 presents a word cloud illustrating key words that were mentioned when describing QOL from each participant's perspective. Examples of words that rose to the top include community partnerships, affordability, flight paths, noise, jobs, and housing.



Figure E-2. Word cloud on quality of life for Tampa International Airport workshop participants.
(Source: Word cloud generated by inputting key words from the workshop into free tool available at WordArt.com).

The following items represent key discussion points considered when refining the Quality of Life Assessment Methodology:

Workshop Preparation and Organization

- TPA reached out to an extensive list of stakeholders for this workshop, including school boards, neighborhood associations, development councils, and more. The list was derived from a stakeholder list used for TPA's Master Outreach Plan. Similar sources could be considered by other airports as a starting point when drafting a list of stakeholders.

Methodology Feedback

- A participant was concerned about the ability of survey respondents to intentionally skew answers to produce a certain outcome and noted the importance of the guidebook clearly defining options for how the survey can be administered. The group discussed several approaches that could be taken to minimize this concern, based on prior experiences administering questionnaires. For example, several participants mentioned the utility of having the survey administered by a Planning Commission or MPO instead of the airport. They thought this may increase "trust" in the resulting assessment data, with the added benefit of involving another party to add to the resources necessary for completing a full QOL assessment.
- Participants discussed considerations when defining the study boundary.
- Like the Dallas–Fort Worth workshop participants, participants in the TPA workshop noted the importance of making it clear that the point of an assessment is not to calculate a QOL score that can then be compared to another airport.
- Participants sought clarification on the importance scores and weighting mechanism.

Feedback on Qualitative Indicators

- The workshop participants provided input on all the qualitative indicators during the meeting. This input was combined with the input of the other two airport workshops to revise the methodology and indicator list.

Feedback on Demographic Questions

- Participants recommended using zip codes instead of having participants select whether they live in an urban, suburban, or rural area. They indicated that individuals may interpret these classifications differently.
- Participants encouraged the research team to revisit the initial categories for education, age, and race/ethnicity.
- Participants suggested revisiting the upper and lower bounds included in the response options for how far survey respondents live from the nearest airport. They also suggested mentioning a specific airport when administering the survey rather than saying “closest major airport,” though this may introduce other biases.
- Participants suggested a new question about whether the survey respondent has any children or dependents.

General Comments/Considerations

- Participants reported that a small population is affected by noise from the airport, although it continues to be an area of concern noted by many stakeholders. Also, noise annoyance varies by time of day for various communities in TPA, with some experiencing it in the morning and some at night. This could be considered in a QOL assessment.
- Participants sought additional information related to the purpose of this study and how the data can ultimately be used by airports. They noted that increased communication and sharing of information between the airport and community groups lead to positive relationships.

E.4 Portland International Jetport (PWM)

The workshop at Portland International Jetport (PWM) was held on Thursday, June 27, 2019. Research team members who attended in person include Mary Ellen Eagan (HMMH), Julie Blue (ERG), Rebecca DeVries (ERG), and Julia Nagy (HMMH). The primary contacts for the airport included the airport director and the marketing and communications coordinator. Over 20 external stakeholders from surrounding communities and organizations were invited to participate in the workshop, including members of the Noise Advisory Committee (stakeholders with asterisks participated in the workshop):

- Portland City Councilor
- Peaks Island resident
- Westbrook City Councilor
- South Portland City Councilor
- South Portland resident
- Cape Elizabeth Town resident
- The President of the Stroudwater Village Association*
- The President of the Western Prom Neighborhood Association
- Station Manager
- Portland Area Comprehensive Transportation System
- Northeast Air (Fixed base operator)
- Westbrook City Councilor
- WEX, Inc., Unum,* and Idexx
- The President of the Greater Portland Chamber of Commerce
- Parking management at Jetport

Like the workshops previously described, this half-day workshop began with an introduction to the project, roundtable introductions and discussion of what QOL means to each participant, and a brief presentation from airport personnel covering background of the airport and, in this case, introducing the airport's sustainable airport master plan (SMP). They noted that PWM was one of the first airports in the country to develop an SMP. The Quality of Life Assessment Methodology shares many components with the PWM SMP and could serve as a useful resource for airports wishing to develop these types of resources in the future. Figure E-3 presents a word cloud illustrating key words that were mentioned when describing QOL from each participant's perspective. Examples of words that rose to the top of discussion include noise, air service, community, pollution, tourism, and sustainability.



Figure E-3. Word cloud on quality of life for Portland International Jetport workshop participants. (Source: Word cloud generated by inputting key words from the workshop into free tool available at WordArt.com).

The following items represent key discussion points considered when refining the Quality of Life Assessment Methodology:

Workshop Preparation and Organization

- Participants identified the following key stakeholders:
 - Neighborhood associations/community leaders who can engage residents;
 - People who do not live in the local community but who work there and can be identified through professional organizations;
 - Noise *advisory committees, chambers of commerce*, local businesses, and political/elected officials; and
 - Residents and elected officials from surrounding communities.

Methodology Feedback

- Participants noted the importance of providing background information when administering the survey, including an introduction for why the survey is being done. One participant recommended including an (optional) video if the survey is to be administered online.
- Participants expressed concern about the length of the survey and potential survey fatigue, encouraging flexibility in completing the survey so that respondents do not have to complete it all at once. They also suggested formatting the questions in a variety of different ways.

Feedback on Qualitative Indicators

- The workshop participants provided input on all the qualitative indicators during the meeting. This input was combined with the input of the other two airport workshops to revise the methodology and indicator list.

General Comments/Considerations

- Participants discussed ways to successfully engage with various stakeholders on topics that multiple parties can benefit from. For example, airports can communicate with realtors and developers in order to ensure that home buyers are aware of the reality of living near an airport and do not encounter buyer's remorse due to airport noise.
- Several participants felt that a QOL assessment likely could not be used as a standalone tool. While they saw the value in identifying community QOL issues, they viewed this as an "add-on" process to some other preexisting study or larger effort, such as a Master Plan update.
- One participant noted that surveys are viewed as a valid way to gather information and felt that a QOL assessment administered by the airport could be trusted, relevant, and valuable as long as the process is validated and the sample size is large enough.
- Participants noted the importance of defining the assessment boundary.
- Participants discussed end-uses of the tool, noting that the tool is designed to bring stakeholders together in the community. The goal of the assessment is to promote effective dialogue, as well as proactive and sustained awareness by the airport with the community it serves.
- Participants discussed how airports can select indicators that they should monitor over time to observe how they change, possibly as demographics change. Changing QOL indicators could be an early warning sign that changes are occurring in the community.



APPENDIX F

Sample Quality of Life Assessment Introduction PowerPoint

This presentation is intended as a tool for airports undertaking a QOL assessment to help introduce the ACRP project and assessment methodology to internal airport stakeholders and community members. The slides—found at www.trb.org by searching for “ACRP Research Report 221”—can be edited and customized as airport needs dictate.



APPENDIX G

Examples of Data Visualizations

As described in Chapter 5, there are many options for visualizing data collected as part of a QOL assessment and presenting it for interpretation, analysis, and decision-making purposes. To demonstrate some possibilities, qualitative data was gathered voluntarily from research team members living within the service area of a large international airport, and quantitative data was obtained from publicly available data sets covering the same spatial area. Research team members in this area provided qualitative information via an online version of the Quality of Life Assessment Survey Tool (Appendix A). These participants are not a representative sample of the population residing in the airport service area and the data were not collected from them with the goal of evaluating QOL for the full community surrounding the airport. Rather, these data were simply gathered so that the research team could develop example quadrant plots.

The remainder of this section presents a brief overview of the data, the demographics of the participants, and a series of example quadrant plots.

G.1 Data Collection

The Quality of Life Assessment Survey Tool (Appendix A) was entered into an online survey tool to facilitate data collection from voluntary research team members. Thirty-two individuals from the research team completed the survey, responding to each of the qualitative indicator questions, as well as ranking the importance of each qualitative and quantitative indicator to their QOL or the QOL of their community. They also responded to the demographic questions included in the survey as optional (e.g., age, income, and education). Participants were instructed to skip any question that they did not want to answer, though most participants responded to all questions (however, participants did not enter their names, so the individual responses were not attributed to specific members of the research team). Once the data were collected, participant responses were converted to QOL scores and then averaged for each qualitative indicator. Average importance scores for all indicators were also calculated.

The research team also compiled publicly available data for each of the quantitative indicators. In general, quantitative data were compiled at the scale that aligned with the service area of the airport, when possible, and at regional scales when the team judged that the data would still reflect conditions within the service area and no finer scale was available. As noted in the guidebook, there must be some flexibility in determining the appropriate scale of analysis on a case-by-case basis. For some indicators, data were gathered for the large city being evaluated. For other indicators, data were gathered at a finer

scale (i.e., to represent the dense urban core) or at the scale of the broader metropolitan statistical area encompassing the city and several surrounding communities. For all indicators, the research team used the suggested data sources and thresholds presented in the Excel spreadsheet included as Appendix B. These thresholds were used to convert results to QOL scores.

G.2 Demographics

The demographic questions included in the Quality of Life Assessment Survey Tool are not required when conducting a QOL assessment, although the resulting socioeconomic and demographic data can provide useful background on the sample population and offer insight into findings from the quadrant plots. A majority of the participants identified as white (88 percent) and as having received either a bachelor's degree or graduate degree (91 percent). A larger percentage of the participants identified as female (64 percent) as compared to male (36 percent), owning their home (65 percent) rather than renting (32 percent), and as being married or in a domestic partnership (67 percent). As for age, there was a fairly even distribution across the 25–34, 35–44, and 45–54 age groups, with fewer participants reporting ages of 18–24 and 55–64.

In some cases, it may be useful to look at the distribution of the demographic data. A close review of these data can help airports to identify additional factors to consider when evaluating QOL and to understand the QOL issues that rise to the top for their community. This can also be useful when considering QOL issues for some of the more vulnerable members of the local community.

As an example, the histogram below presents the frequency distribution for the distance (in miles) that participants reported living from the closest major airport (Figure G-1). Given the variability in distance from the airport, it might be useful to evaluate QOL while stratifying the data on this particular variable.

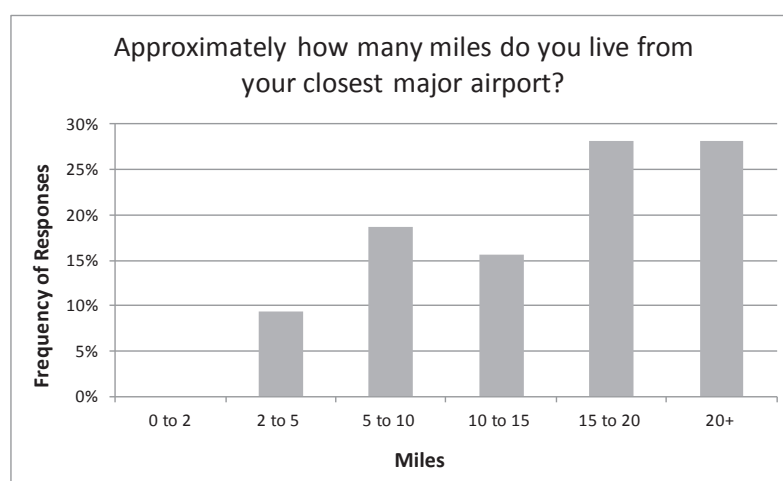


Figure G-1. Example frequency distribution for a demographic variable.

G.3 Quadrant Plots

When an airport completes a full-scale QOL assessment and is able to collect data and assign QOL scores and importance scores to multiple quantitative or qualitative indicators, quadrant plots are a useful tool

for displaying aspects of QOL in the surrounding community. In these plots, importance scores are presented on the vertical y-axis and QOL scores are presented on the horizontal x-axis for each indicator. The plots consist of four quadrants that can be used to determine which QOL issues are a high priority, which issues should be monitored for changes, which are low priority, and which are smaller issues that may—if numerous and affecting the same lives—result in aggregate lower QOL for community residents.

Quadrant plots can be developed for a single member of the community or for the entire community. When results are presented for a community, QOL scores and importance scores must first be averaged. This can be done using simple averages (as described in Chapter 5 and used for this example). Alternatively, more complex approaches can be used to compensate for the phenomenon, whereby averaging artificially increases the number of mid-ranged scores (i.e., 2s and 3s) in the final results. One more complex approach to averaging involves weighting more heavily the 1s and 4s among the QOL scores being averaged, such that the extremes of very low or very high QOL (or importance scores) will be reflected in the final results (as noted in Appendix D). Regardless of the approach, there are many options for displaying these data and airports may consider multiple presentations, depending on their interests and needs. Examples of ways to explore QOL indicators with quadrant plots include, but are not limited to:

- Presenting results for all the indicators, either showing each indicator on the plot or showing the total count of indicators that appear in each quadrant by category;
- Presenting only qualitative indicators or only quantitative indicators;
- Presenting indicators for a specific category (e.g., transportation, environment, and health); and
- Presenting indicators for a subset of the sample population (e.g., a certain neighborhood or community, a vulnerable population, or those who live closest to the airport).

In addition to the quadrant charts, airports might be interested in viewing the distribution of QOL scores or importance scores for the sample population. Because these scores are averaged across participants, there may be cases in which it is worthwhile to evaluate the data more closely to ensure that the averaging approach being used is not diluting any potentially important indicators associated with a low QOL. This exercise can also be done considering variations in demographic, socioeconomic, or geographic variables (e.g., race or ethnicity, income, proximity to the nearest airport, and neighborhood).

Several example quadrant plots are presented in the following pages using the data described above. Figure G-2 presents a count of the total number of indicators that fall in each quadrant for a given category. This can be used as a quick way to identify categories that might warrant further analysis or pose the biggest obstacles to a high QOL for an individual or within the whole community. For example, Figure G-2 identifies 10 local governance indicators with an average QOL score of 3 and an average importance score of 3, indicating that it might be beneficial to monitor these indicators for changes. Figures G-3 through G-8 present qualitative and quantitative indicators by category. In these plots, indicator numbers are included to allow the user to quickly identify QOL issues to address or monitor.

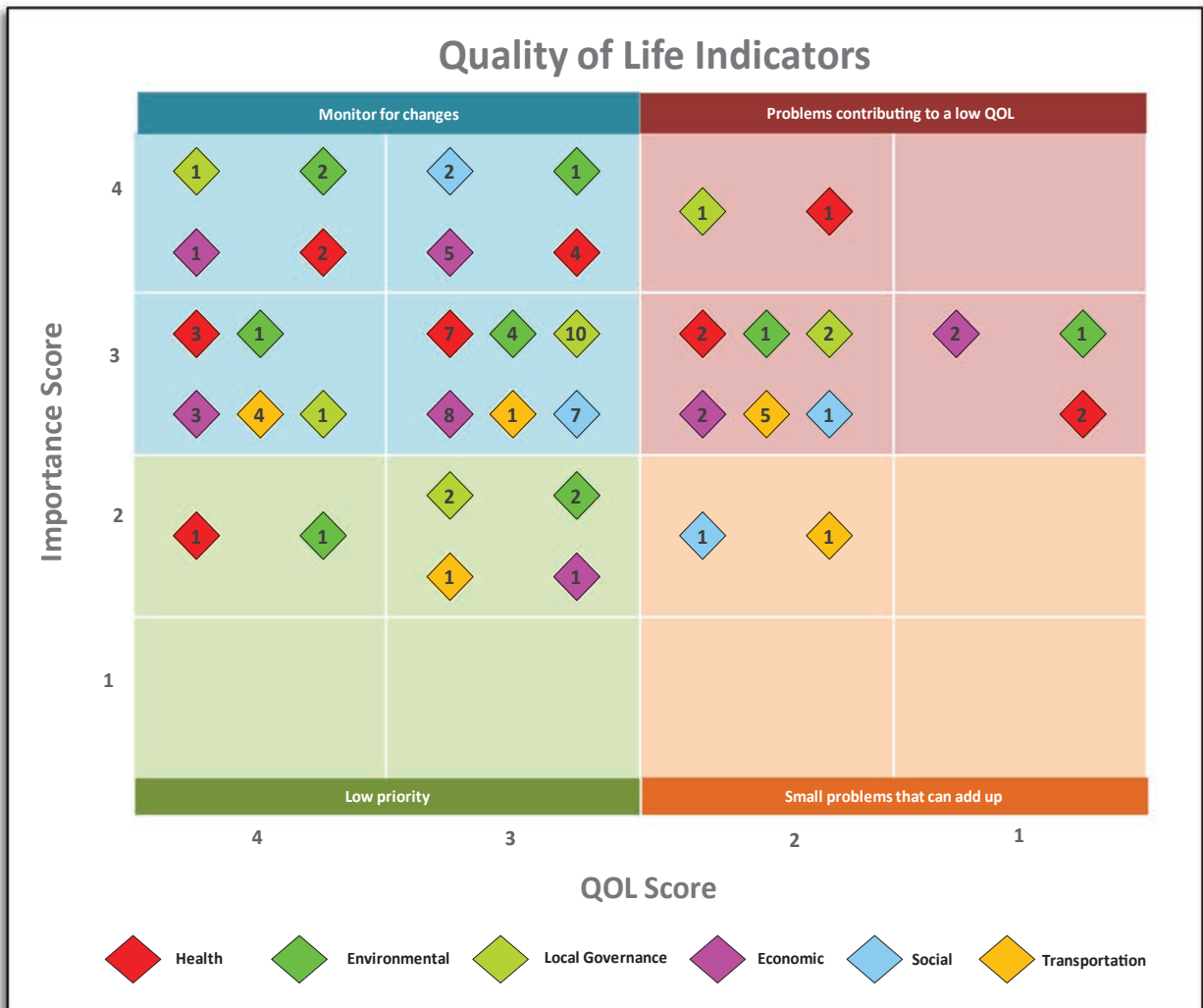


Figure G-2. Example quadrant plot for all indicators.

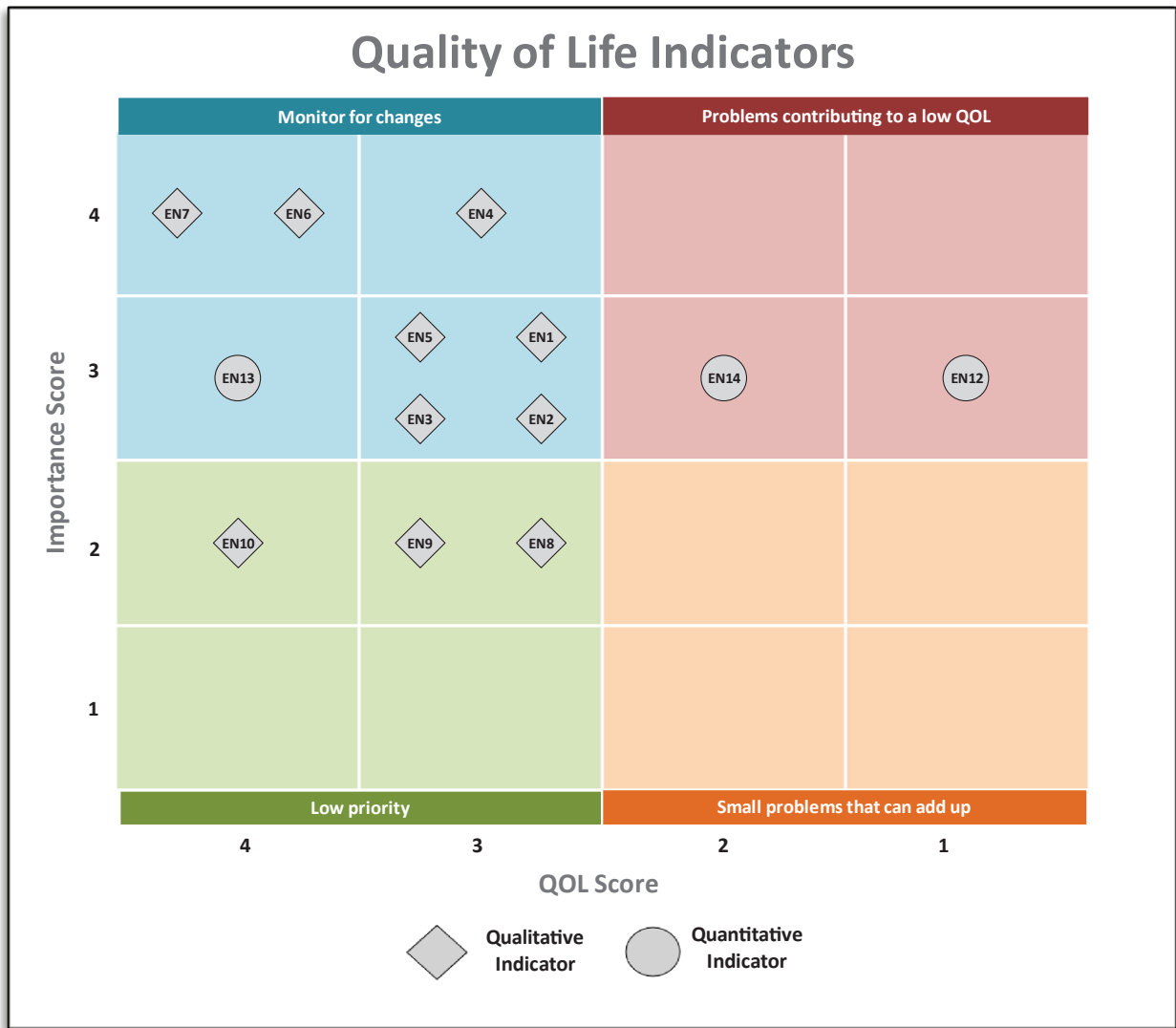


Figure G-3. Example quadrant plot for environmental indicators.

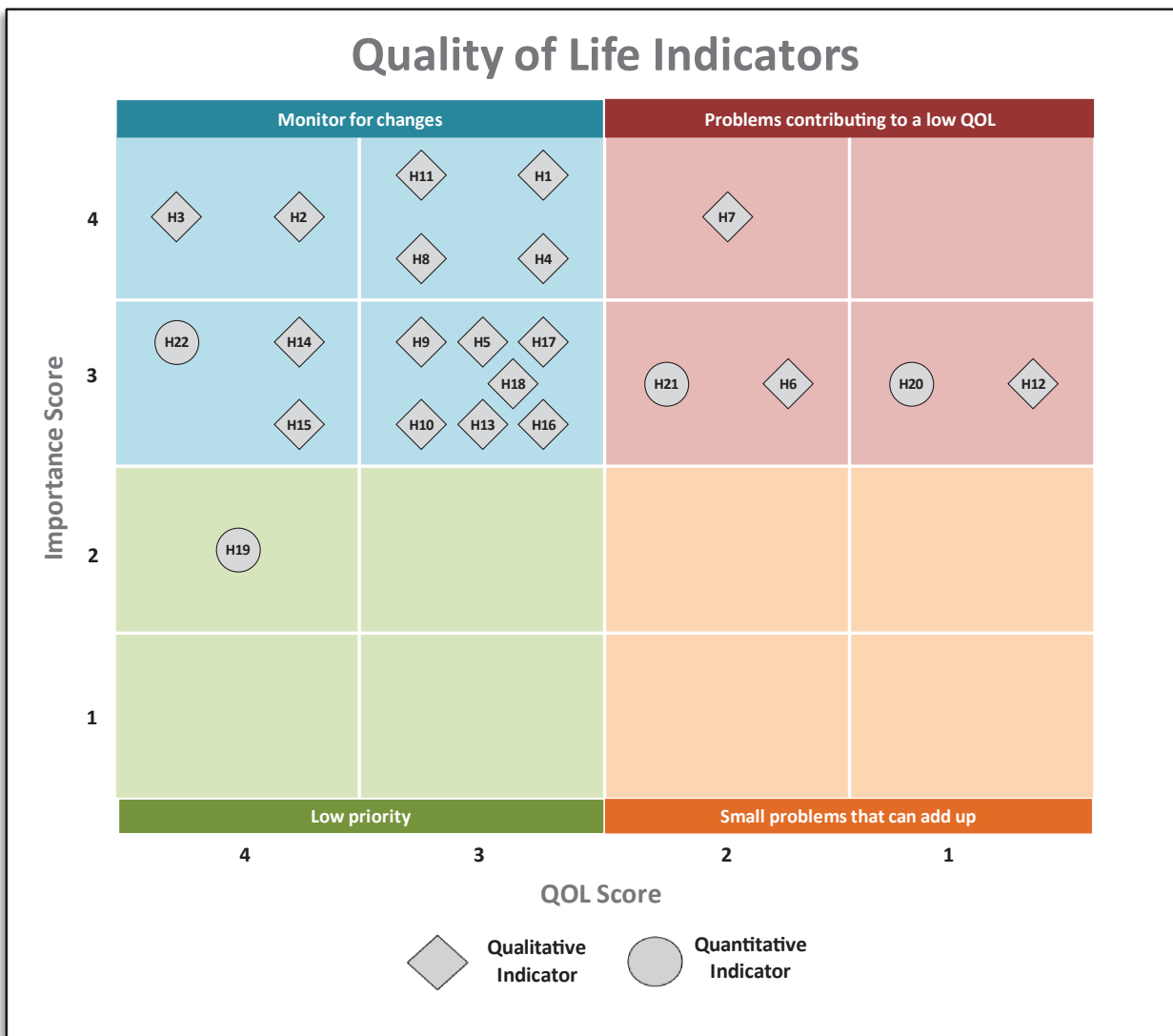


Figure G-4. Example quadrant plot for health indicators.

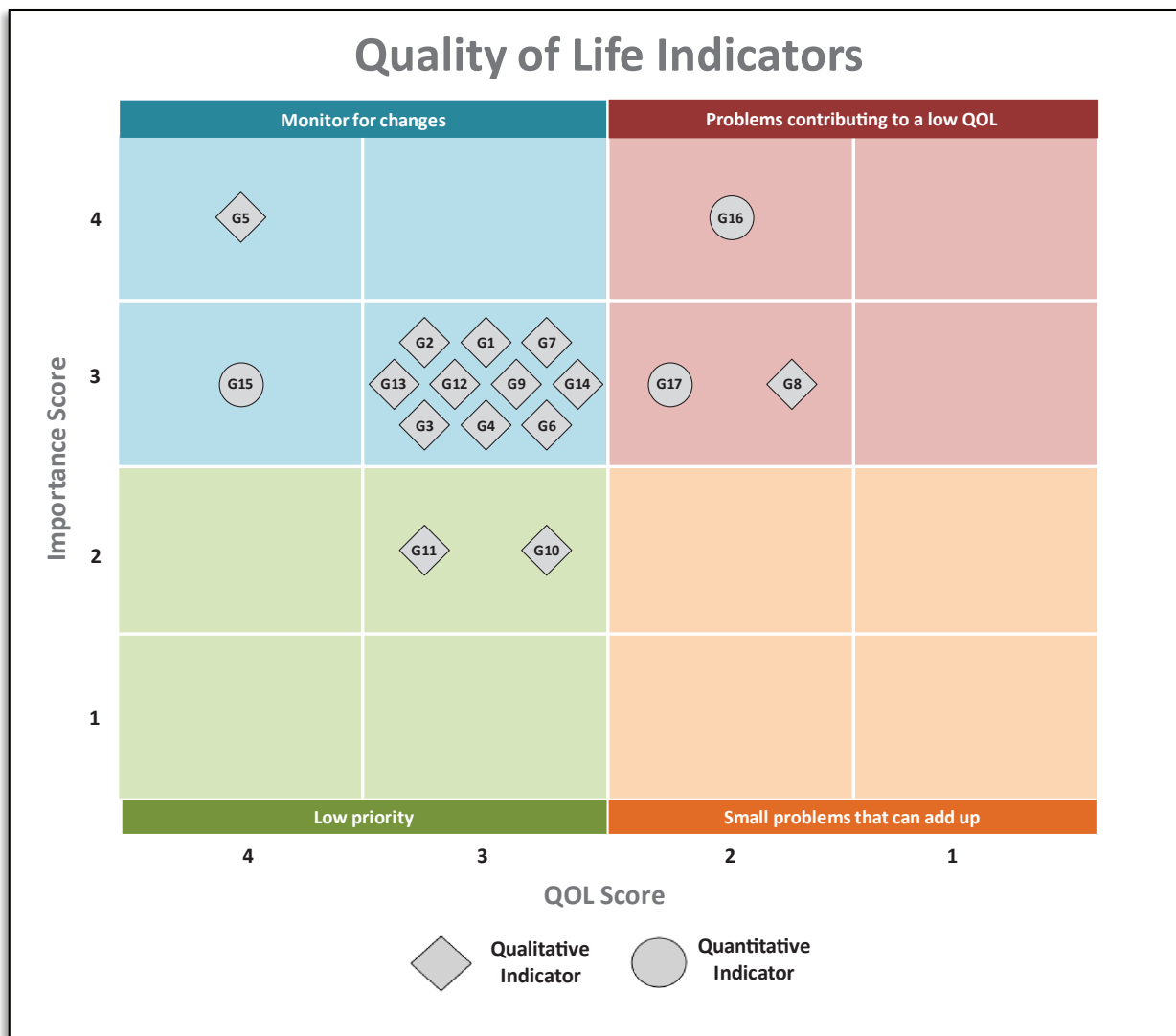


Figure G-5. Example quadrant plot for local governance indicators.

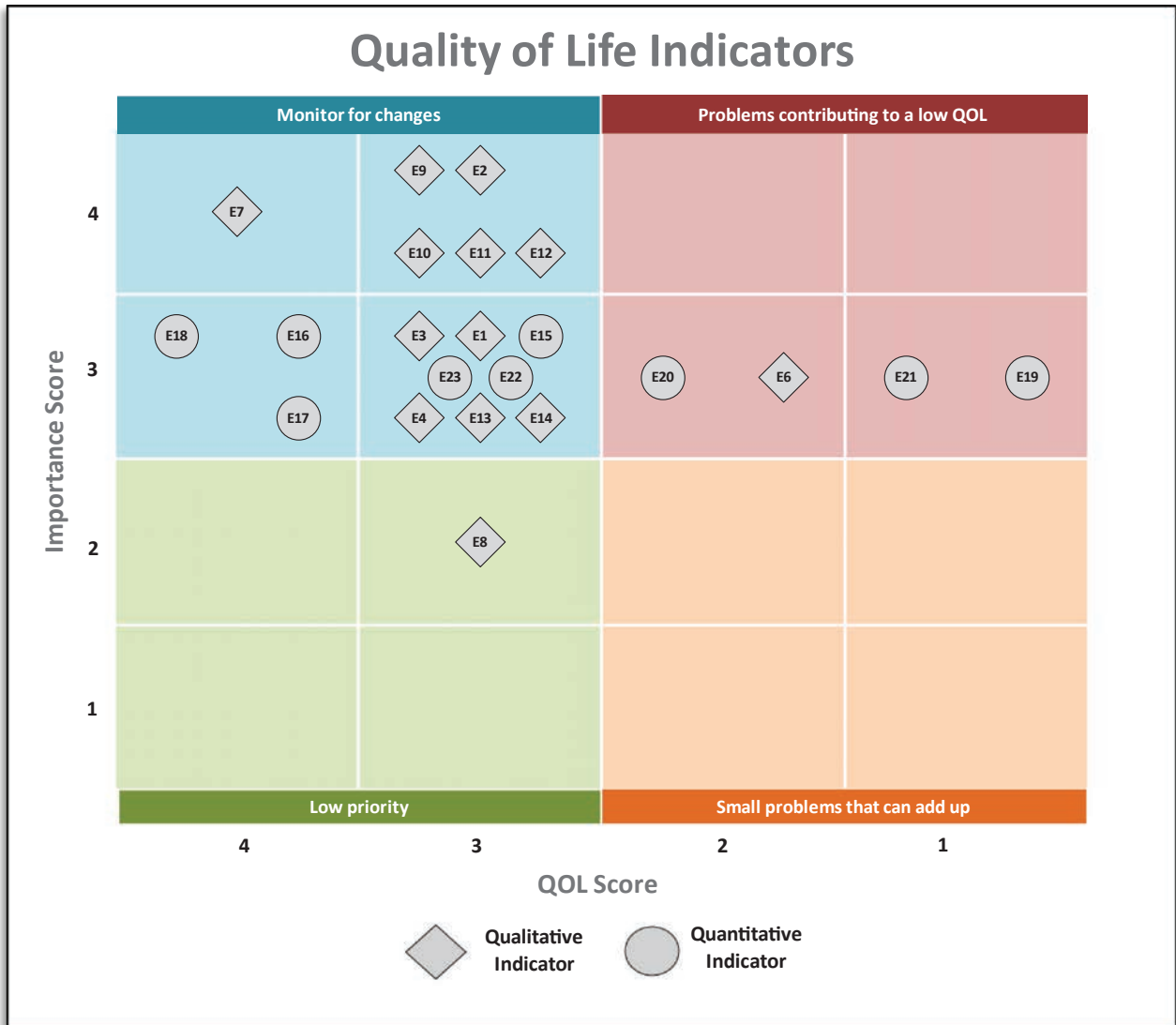


Figure G-6. Example quadrant plot for economic indicators.

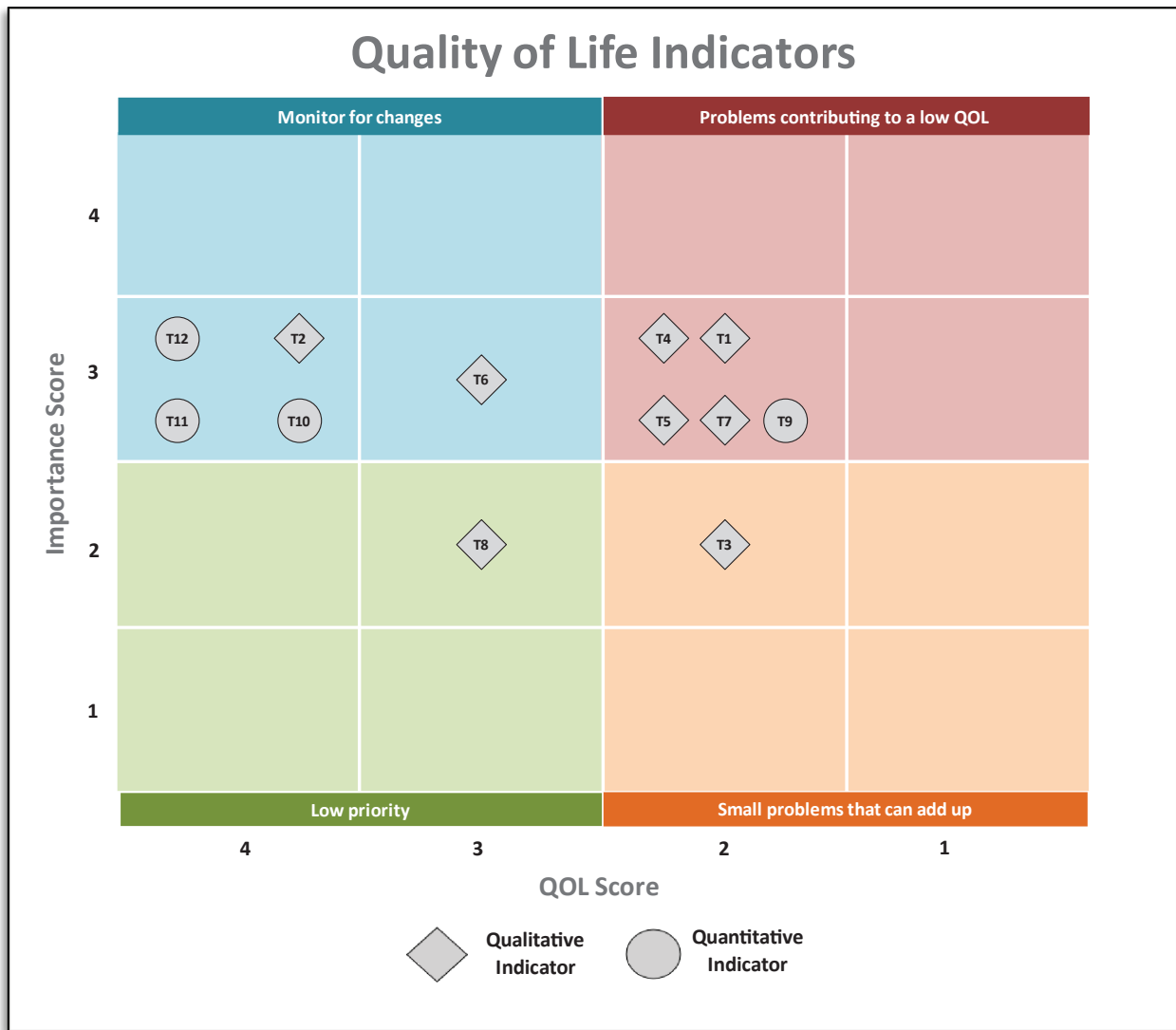


Figure G-7. Example quadrant plot for transportation indicators.

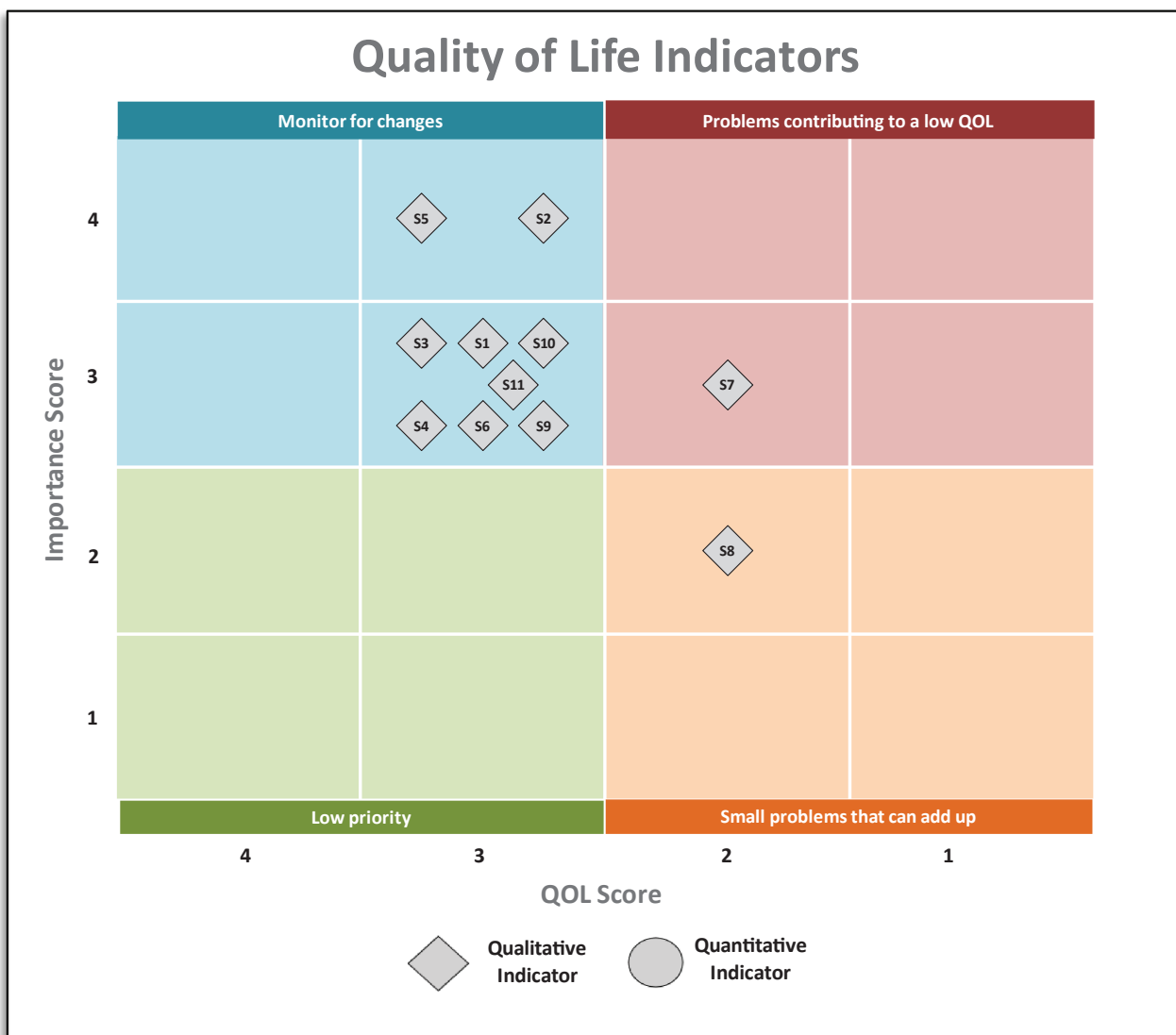


Figure G-8. Example quadrant plot for social indicators.

Abbreviations and acronyms used without definitions in TRB publications:

A4A	Airlines for America
AAAAE	American Association of Airport Executives
AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ACI-NA	Airports Council International-North America
ACRP	Airport Cooperative Research Program
ADA	Americans with Disabilities Act
APTA	American Public Transportation Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATA	American Trucking Associations
CTAA	Community Transportation Association of America
CTBSSP	Commercial Truck and Bus Safety Synthesis Program
DHS	Department of Homeland Security
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FAST	Fixing America's Surface Transportation Act (2015)
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
HMCRP	Hazardous Materials Cooperative Research Program
IEEE	Institute of Electrical and Electronics Engineers
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITE	Institute of Transportation Engineers
MAP-21	Moving Ahead for Progress in the 21st Century Act (2012)
NASA	National Aeronautics and Space Administration
NASAO	National Association of State Aviation Officials
NCFRP	National Cooperative Freight Research Program
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
PHMSA	Pipeline and Hazardous Materials Safety Administration
RITA	Research and Innovative Technology Administration
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (2005)
TCRP	Transit Cooperative Research Program
TDC	Transit Development Corporation
TEA-21	Transportation Equity Act for the 21st Century (1998)
TRB	Transportation Research Board
TSA	Transportation Security Administration
U.S. DOT	United States Department of Transportation

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