Community Participation in Urban Sanitation: Experiences in Northeastern Brazil

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The participation of users—in designing and implementing projects and managing water and sanitation services—is now being built into [World] Bank funded projects with the aims of increasing efficiency, equity and cost recovery and facilitating the extension of service coverage to poor communities.

Watson and Jagannathan (1995, 1)

Community participation is frequently identified by scholars and practitioners as central to success in delivering physical infrastructure services (e.g., World Bank 2004). However, much of the community participation literature does not carefully explain the impacts of different forms of participation on project effectiveness. It is often assumed that participation in all aspects of service delivery (e.g., project selection, design, construction, and maintenance) contributes to more successful project outcomes. Moreover, findings from the community participation literature are sometimes applied across a broad spectrum of service sectors (e.g., water, sanitation, education, and health care) and settlement types (e.g., rural, urban, suburban, and periurban). Although we were guided by the literature to believe community participation would contribute positively to project effectiveness, we sought to examine the concept of participation more carefully by distinguishing among forms of participation and by viewing participation in infrastructure projects as part of a broader network of relationships among citizens, sewer practitioners, and officials.1

Most of the empirical evidence concerning the performance outcomes of projects in which community members participate is based on studies of rural water projects (e.g., Isham and Kahkonen 1999; Narayan 1995; Ostrom 1992; Prokopy 2002, 2005; Wade 1988; Sara and Katz 1997) and from other public service sectors where the concept of participation may be viewed as a form of “co-production”; that is, citizens provide inputs to services that are traditionally produced exclusively by public agencies2 (Brudney and England 1983; Percy 1984; Sundeen 1985; Levine 1984). For example, citizens have been involved in the co-production of metropolitan police services (e.g., Ostrom, Parks, and Whitaker 1978; Parks et al. 1982) and primary education (e.g., Ostrom 1996). Support for participation has emerged in each of these sectors. One reason is that some degree of social change—new habits, skills, or awareness by the beneficiaries of the service—is often an important aspect of service delivery outcome (Whitaker 1980). Community participation has been found to be effective in the provision of public or quasi-public services (as opposed to commodity goods), networked services that are difficult to distribute, and services in which contributions from citizens and government agencies are complements.

Abstract

This article explores how well community participation explains variations in the performance of sanitation projects in Brazilian cities. Case studies of condominial sewers in Recife and Natal, Brazil, reveal a variety of activities that we categorize into four forms of participation: mobilizing, decision making, construction, and maintenance. Mobilizing and decision making were associated with performance in the cases we examined. Our results suggest that participation form as well as community influence are important. The hypothesis that increased participation enhances performance is an oversimplification for condominial sewers.

Keywords: community participation; Brazil; Latin America; municipal and public services; sanitation; condominial sewers

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and not substitutes (Ostrom 1996). Brazil’s “condominial” sewers are a good example of co-produced service delivery, because citizens work directly with government agencies to produce and provide the service.

**Condominial Sewers in Brazil**

Brazilian engineers began experimenting in the early 1980s with a decentralized, low-cost approach to wastewater collection known as condominial sewers. These systems are less expensive than conventional sewers, because sewer laterals are installed under sidewalks or yards of homes instead of under streets. Costs are lower because laterals can be made with less expensive material than is used in conventional sewers. Costs can be further reduced by having project beneficiaries participate in constructing and maintaining portions of the system, most commonly the household connections—sections of the sewer line running from the house to the clean-out box that is part of the condominial sewer line.

Condominial sewers were developed in Brazil to expand household wastewater collection service to unserved (often low-income) population groups (Sinnatamby 1983; World Bank 1994). More specifically, condominial sewers were adopted to overcome many of the obstacles associated with conventional sewers, including (a) the high cost of conventional sewer systems, (b) low household connection rates to conventional systems because of a lack of demand at prevailing prices, and (c) people’s aspirations for a flexible sewerage solution that could be upgraded to a conventional sewer as incomes rose (Bakalian and Jagannathan 1991). An implicit hypothesis of the condominial sewer approach is that community participation in project planning, design, construction, and maintenance contributes to better project outcomes. In their comments about condominial sewer technology, for example, Bakalian and Jagannathan (1991, 1) note that “its success hinges on the readiness of the community to participate in the various phases of the project cycle.” In addition to their use in Brazil, condominial sewer systems have been constructed in Bolivia, Guatemala, Zambia, and Pakistan (Mara 1996).

A key research objective was to determine whether and how different forms of community participation are associated with project outcomes. We were motivated to investigate community participation in condominial sewers because the literature does not offer any project-scale case studies on how people participate in condominial sewers, nor does it indicate which forms of participation are associated with various project outcomes. On the first point regarding how people participate, we conceived of participation in condominial sewer projects in the same way that practitioners in sanitation agencies in Brazil think about it, that is, in the context of a four-part “project cycle” that provides a framework for managing the great number of tasks involved in taking a project from conception to operation. The four parts consist of planning, design, construction, and maintenance. Condominial sewer practitioners in Brazil have devised ways to engage the community in each of these project phases. Mobilization, which is the form of participation that occurs (more or less) during the planning phase, involves planners bringing together residents to explain the costs and benefits of condominial sewers. The degree to which residents can be mobilized is felt to reflect demand for condominial sewers, and many analysts believe that demand is linked to project success. Decision making, where local insights and local knowledge are brought to bear on project decisions, is the form of participation that takes place (more or less) during the design phase. The potential link to project success is that this local knowledge will lead to designs that are more sensitive to local conditions and the needs of the community to be served. Community participation in project construction is thought to enhance the likelihood of project success by reducing project costs and bringing about a sense of ownership among the participants. Community participation in project maintenance takes place during the final stage of the project cycle, and regular and timely maintenance can clearly be linked to positive project outcomes.

Community participation in construction and maintenance activities, which are normally performed by sanitation agency staffs or contractors, can potentially lead to better cost recovery and higher connection rates. However, having residents perform this work would not necessarily be more effective in terms of the operability and health impacts of the system because the quality of construction and maintenance work performed by residents may not be high. This might appear to be an obvious statement, but it has not been addressed in the participation literature because the concept of participation has rarely been disaggregated by form.

Our research question may be stated as follows: Do different forms of participation contribute differently to project outcome, and if so, how? In investigating this question, we gave particular attention to the way in which project outcome is conceptualized and measured because we felt that different forms of participation might affect different types of project outcomes. Sewer performance evaluations most often use cost recovery and coverage (e.g., the percentage of a community served by sewers) as measures of efficiency-based outcomes, but these overlook important effectiveness-based outcomes, such as the impacts on health and livelihoods that are a consequence of how sewer systems actually function. The effectiveness-based performance outcomes used in our cases are detailed in Nance (2005) and summarized in a later section of this article. By disaggregating participation into four components and focusing on effectiveness-based outcome measures that include impacts on the health and livelihoods of the communities served, a nuanced approach to studying the impacts of participation is possible.
The literature also lacks a discussion of the relative importance of community participation compared to other factors that may explain the performance of condominial sewers, and this is a subject explored later in this article. Our research builds on Gabrielle Watson’s (1995) empirical study of condominial sewers. The objective of Watson’s study was to assess “institutional issues, with the aim of highlighting the achievements of the condominial system and pointing to areas that require more attention” (Watson 1995, 7). She described condominial sewer experiences in seven Brazilian cities; however, her study did not assess participation and performance at the project (i.e., neighborhood) level. Based on the mixed performance results reported in Watson’s survey, follow-on research at the project level is crucial to understanding how participation shapes condominial sewer performance. We build on Watson’s study by tracing participation experiences at the level of the neighborhoods served by condominial sewer projects.

By design, condominial sewerage in Brazil in the 1980s and early 1990s was often organized in a decentralized fashion, and this reduces the value of a city-level representation of participation practices and performance outcomes. Condominial sewers were produced in different ways by different communities and agencies, and they were installed in highly variable circumstances. For example, in some cities, condominial sewer services were delivered one project at a time in individual neighborhoods that were not unified by a public trunk sewer system. Many Brazilian cities did not have trunk sewers that served the entire city. Instead, the trunk systems typically served only the wealthier areas of cities. The majority of homes either relied on individual on-site systems (i.e., pit latrines, septic tanks, and leach pits), or they released wastewater to storm drains, street gutters, and open ditches. In many cities, when sewer coverage was expanded using condominial sewers, those sewers were not linked to the trunk system. Sewage from the condominial sewers was discharged untreated into ponds, canals, and storm drains, often shifting sanitation problems to other parts of the city rather than solving them. The service provided was not uniform across a city, and the level of community involvement in condominial sewers and the quality of service outcomes were generally neighborhood specific. Given this local variability, household and neighborhood level information is needed to fully understand people’s activities in project development and to reason about how their participation affected project performance.

In addition to variation at the neighborhood (i.e., project) level, there are important differences at the city level that can contribute to our understanding of the conditions in which participation affects project performance. A city that has condominial sewer projects delivered by a single agency using a coordinated approach (and standardized procedures for involving residents in project design and implementation) would be expected to produce a different set of project outcomes from a city that has several uncoordinated agencies implementing projects in an ad hoc manner. The two cities included in our investigation—Recife and Natal, Brazil—employed these two contrasting approaches during the period studied. In Natal, condominial sewer projects were implemented by one entity, the North Rio Grand State Water and Sanitation Agency, which embraced condominial sewer technology and was committed to community participation. This agency implemented new condominial sewer projects as part of a plan to expand the trunk sewer network. In Recife, four agencies were involved in condominial sewer implementation: the State Water and Sanitation Agency of Pernambuco, the State Housing Agency, and two municipal bodies—the Urban Planning Agency and the Public Works Agency. These four agencies did not always cooperate, and they did not follow a cohesive urban development plan with regard to sanitation. The agencies also differed in their support of condominial sewers as an appropriate technology and in their commitment and approaches to community participation.

In the remainder of this article, we explore the following questions at the project level: What forms of community participation were used in each of several case study condominial sewer projects in Recife and Natal, and which forms were associated with enhanced sewer service outcomes? We begin by presenting our overall research approach.

Research Methods

Preliminary fieldwork was conducted in May 1994. Most of the data were obtained during ten months of fieldwork from October 1994 to July 1995, and follow-up observations were made in January and February 2006. The fieldwork was conducted in Brazil’s poorest region, the Northeast, in the capital cities of Recife and Natal. Because of its low cost, condominial sewerage was particularly appropriate for the Northeast region, and at the time of the initial fieldwork, the region had the most widespread experience in Brazil with condominial sewers. We selected Recife and Natal as research sites because each city had over five years of condominial sewer experience and at least five condominial sewer projects in various stages of implementation, and each city had officials and agency staffs willing to cooperate with us. In addition, some written information was available on the condominial sewers in each of the cities.

Use of Purposeful Sampling to Select Cases

We chose not to use a large-sample, statistically oriented research approach. Although that strategy would have facilitated generalization, it would not have allowed us to obtain the detailed understanding of project design and operations that
we felt we needed. We wanted details on the role of community participation in each project so that we could investigate links between different forms of participation and project outcome. We also wanted to examine how factors unrelated to participation might have influenced outcomes. A multiple case study approach allowed us to obtain an appropriate level of detail.

Our strategy for selecting cases was to identify contingently a small number of projects that, in the judgment of condominial sewer practitioners at local sanitation agencies in Recife and Natal, represented examples of particularly good and bad performance. In the course of our detailed case studies, we could verify whether the projects selected were in fact good or bad in terms of performance. The cases employed a multi-stakeholder approach to develop a comprehensive assessment of what constituted high- and low-performing projects. This case selection technique, which purposefully selected illustrative good and bad projects, is grounded in the standard literature on qualitative research design.\(^8\) Patton (2002, 231) characterizes the approach as a form of purposeful sampling that he refers to as “extreme sampling.”

On the basis of our conversations with condominial sewer practitioners in Recife and Natal, we knew (in advance of selecting our cases) that some projects that practitioners considered good performers had poor community participation, and some projects that they considered poor performers had good community participation. In selecting our case studies, we used an additional criterion related to whether, in the judgment of condominial sewer practitioners, the projects in their cities had levels of community engagement in their participation programs that were “good” or “bad.” This information on levels of participation, together with information on practitioners’ opinions regarding performance of projects in their cities allowed us to array twenty-one different projects in a two-by-two table, with cells representing good and bad project performance and good and bad participation (see Table 1).\(^9\) We then selected cases such that we had at least one case from each cell.

We considered participation in choosing cases because we wanted to avoid the possibility of ending up only with good performing cases that had good participation and bad performing cases that had bad participation. Our principal interest in doing this case study work was to explore relationships between community participation and project performance. A set of cases involving projects from all four cells of the two-by-two table would provide us with the most information about possible relationships between participation and performance. Moreover, this selection would allow us to avoid having only cases where good projects had good participation and bad projects had bad participation, even though that was consistent with our initial hypothesis (i.e., what we expected based on the community participation literature). We make no claim that the cases we examined are a representative sample in a statistical sense. They were not selected to be representative but to maximize our opportunities to learn.\(^10\) These aspects of our approach must be kept in mind when considering our conclusions.

A particular challenge in this approach is that we could not confirm the judgments about best and worst cases offered by sanitation agency staffs until after we conducted detailed case studies. As explained later, sanitation agency staffs have their own views on what is effective, and those views may not correspond with what is observable “on the ground,” or to the views of community members using the sewers. For this reason, we sought viewpoints from multiple stakeholder groups to confirm that we were maximizing differences among the cases.\(^11\)

| Table 1. Two-by-two matrix of candidate projects from which the cases were selected. |
|-------------------------------|-----------------------------------|
| Good Participation | Bad or No Participation |
| Good performance | Alemao |
| Norte e Sul | Playa Bebera |
| Lago Santa Paula |
| Rio Jorge | Jardim Sepa |
| Entra Paraiso | Triburi Alto |
| Vila Triburi | Santa Ilena |
| Bad performance | Rosa |
| Quatro |
| Bom Freire |
| Brasilia | Jose Pico |
| Vila Maria | Bambino |
| General Fabio | Cabanga |
| Casa Jeri | Grand Favela |


Note: Underlined projects are located in Recife; projects in italics are located in Natal. At the time these data were gathered, Recife had many small projects, and Natal had fewer large projects. Also, the projects in Recife had a higher rate of performance failure compared to the projects in Natal. Not listed are nineteen additional projects for which practitioner judgments of performance and participation were ambiguous (ten in Recife and nine in Natal). Original project names have been changed to preserve the anonymity of the communities.
Table 2.
General information about the seven selected case study projects.a

<table>
<thead>
<tr>
<th>Case Study</th>
<th>Implementing Period</th>
<th>Implementing Agency(s)</th>
<th>Total Homes</th>
<th>Estimated Population</th>
<th>Income Level</th>
<th>Percentage of Condominial Sewer Coverage</th>
<th>Percentage of Overall Sewer Coverage</th>
<th>Sewer Performance Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>1986-1988</td>
<td>OBRAS, COMPESA</td>
<td>293</td>
<td>1,327</td>
<td>Middle</td>
<td>79</td>
<td>82</td>
<td>67</td>
</tr>
<tr>
<td>R2</td>
<td>1987-1992</td>
<td>URB, COMPESA</td>
<td>158</td>
<td>705</td>
<td>Low</td>
<td>48</td>
<td>48</td>
<td>12</td>
</tr>
<tr>
<td>R3</td>
<td>1987-1990</td>
<td>COHAB, COMPESA</td>
<td>1,349</td>
<td>6,340</td>
<td>Poor</td>
<td>100</td>
<td>100</td>
<td>71</td>
</tr>
<tr>
<td>N1</td>
<td>1987</td>
<td>CAERN</td>
<td>384</td>
<td>1,789</td>
<td>High</td>
<td>36</td>
<td>92</td>
<td>68</td>
</tr>
<tr>
<td>N2</td>
<td>1986-80</td>
<td>CAERN</td>
<td>757</td>
<td>3,535</td>
<td>Low</td>
<td>76</td>
<td>96</td>
<td>66</td>
</tr>
<tr>
<td>N3</td>
<td>1986-80</td>
<td>CAERN</td>
<td>964</td>
<td>3,663</td>
<td>Lower-Middle</td>
<td>76</td>
<td>93</td>
<td>55</td>
</tr>
<tr>
<td>N4</td>
<td>1987</td>
<td>CAERN</td>
<td>152</td>
<td>668</td>
<td>High</td>
<td>52</td>
<td>100</td>
<td>72</td>
</tr>
</tbody>
</table>


a. The information in this table is based on data gathered during the main fieldwork period in 1994 to 1995. On a follow-up visit to the case study areas in January and February 2006, we observed the following: a general increase in commercial activity in all the neighborhoods, the addition of new buildings and the physical degradation of older buildings, significantly increased crime in the case N2 neighborhood, a significant improvement in the functioning of the treatment plant near the case N3 neighborhood, and a slightly increased presence of gray water and sewage in all of the neighborhoods except in the case R2 neighborhood. The open ditches in the case R2 neighborhood had been lined with concrete half pipes by the city, which had the effect of drying the surrounding soil and improving the overall environment compared to previous conditions but had little to no impact on the relative performance of the case R2 sewer system compared to the other cases. On the basis of these recent observations and by comparison to the original observations in 1994 and 1995, we suspect that if we were to reanalyze the performance of these projects today, they would remain in the same relative performance categories even though the value of each sewer performance index would likely change. In any event, the 2006 observations reported above have no bearing on the analysis presented in this article, which concerns the periods of project implementation and project operations approximately five years after construction.

b. During the implementation period, OBRAS was Recife’s public works department, COMPESA was Recife’s state water and sanitation agency, URB was Recife’s city urban planning department, COHAB was Recife’s state housing agency, and CAERN was Natal’s state water and sanitation agency.

c. To determine the total number of households in each project area, we conducted a neighborhood census in which every household in each project area was counted.

d. Income levels are categorized as follows: high income is >10 minimum salaries per household, middle income is >5 and ≤10 minimum salaries per household, low income is ≥5 and ≤5 minimum salaries, and poor is <1 and ≤3 minimum salaries per household.

e. Sewer coverage (i.e., the percentage of households served) was estimated based on interviews with a representative number of randomly selected households in each project area (at p ≤ 0.10). Sample sizes (by case) ranged from thirty-three to fifty-nine households with a median of forty-one.

f. Overall sewer coverage includes both condominial and conventional sewer connections.

that their subsequent analysis may challenge their initial presumption about the variables. Moreover, in contrast to statistical studies, the qualitative case selection process does not presume a normally distributed population of cases. Some of the most interesting single-case studies address not the average case but an unusual, critical, or revelatory case that needs to be explained. These cases would be ignored in a quantitative selection process because they would be considered outliers. For small-sample research designs, polar cases (i.e., case selection on the extremes of the variables of interest) frequently offer a superior frame of observation than do average cases (i.e., selection on average or middle values) or randomly selected cases.12

Seven Projects in Recife and Natal

We chose three projects in Recife (i.e., cases R1, R2, and R3) and four projects in Natal (i.e., cases N1, N2, N3, and N4) for in-depth study. We assigned pseudonyms to the cases to maintain household and neighborhood anonymity and to comply with privacy requirements for research involving human subjects. Table 2 provides an overview of the seven cases.

Participants in the study included residents living in the case study project areas; community leaders; engineering, community participation, and maintenance staffs of the sanitation agencies; elected officials, agency managers, and appointed agency directors involved in planning and funding condominial sewer projects in Recife and Natal; and other relevant personnel such as employees of consulting and construction companies who worked as contractors for the implementing agencies. Except for residents, we used a snowball sampling technique to identify study participants based on their experience, knowledge, position, and involvement in local condominial sewer projects. Representative samples of households were randomly selected in each case study project area.13 In all, we conducted in-depth, semistructured interviews with residents from 297 households.
and with thirty-one agency staff members and officials who were each knowledgeable about condominial sewer projects. Condominial sewer performance, an important concept in our study, was defined as the sum of the operational effectiveness and beneficial impacts of an individual condominial sewer project, expressed as a sewer performance index (SPI). This index consisted of twenty-seven indicators of performance—twenty indicators of operational effectiveness and seven indicators of impacts—that came from direct observation of the systems in operation and from information obtained in interviews with three groups of stakeholders: residents, sanitation agency engineers, and sanitation agency maintenance staff members. Examples of operational effectiveness measures include the operability of household connections and the existence of sewer line blockages caused by soil, trash, and damaged pipes. Indicators of impacts included ratings by residents of satisfaction with the sewer system and direct observations of sewage on the surface of the ground. Each indicator was converted to a score on an ordinal scale from 0 (least favorable) to 100 (most favorable performance possible with the measurement instruments used). All of the scores were integrated into a single index of performance by adding the median of the twenty operability scores and the median of the seven impacts scores. Each median was weighted equally so as not to place arbitrary emphasis on operability, for which more indicators were available. For purposes of this discussion, SPI scores in the range of 0 to 33 are characterized as low; scores between 34 and 67 are characterized as mid-range; and scores from 68 to 100 are characterized as high. Results from these calculations are shown in the last column of Table 2. For an in-depth explanation of the conceptualization, measurement, and calculation of the sewer performance index, see Nance (2005).

Figure 1 compares the results of recalculating the sewer performance index using all subjective indicators (indicators 1-16 and 21-24) and all objective indicators (indicators 17-20 and 25-27). Although the data can be combined in many different ways, by any reasonable combination of the individual indicators, case R2 is a poorly performing project, and the other cases all achieved significantly higher levels of performance. Put another way, different stakeholders scored projects differently but ranked them similarly. Evidence for these claims is presented in Nance (2005). She found that “different stakeholders scored the same project differently . . . [b]ut these results do not indicate any pattern in stakeholder variability between cases with poor and good performance” (p. 496). Based on her overall analysis of performance, Nance found that engineering staff judgments of performance were unreliable and that engineers had lower internal agreement about performance than project area residents and maintenance staff members. (Engineers play a central role in planning, design, and implementation, but compared to maintenance staffs and residents, they are less familiar with project operations.) Also, maintenance staff members had high internal agreement about performance but were far more critical of performance than the other stakeholder groups. For these reasons, Nance (2005) concluded that a multistakeholder approach to project evaluation (using multiple indicators) was superior to reliance on the viewpoints of a single stakeholder group.

Measuring Community Participation

Community participation was defined at the outset of the study as the involvement in and contributions to a project by individual residents, households, and the community as a whole. We disaggregated this variable into four forms of participation relevant to condominial sewers: involvement in mobilizing support for a project, involvement in decision making, contributions to construction work, and contributions to maintenance work. These were the forms of participation mentioned by practitioners and beneficiaries as relevant to implementing various phases of the project cycle for condominial sewer systems. We represented each form of participation as an index consisting of various participation measures. Each measure was expressed on an ordinal scale from 0 to 100. A total of thirty-one participation measures were used, and scores were assigned based on data obtained from case study documents and interviews with residents and sanitation
agency staffs involved in community participation activities. The interview questions are presented in Tables 3, 4, and 5; conceptualizations of the different forms of participation are described below.

The term mobilizing represents activities in which the implementing agency described to residents the nature of condominial sewers and their advantages in terms of improved health and sanitation and otherwise engaged residents. The goal was to foster widespread support for the project by actions geared toward building a community-wide base of knowledge about condominial sewers (e.g., house-to-house visits to teach every resident about what condominial sewers are and how they function) and by gatherings where residents could express their needs and preferences concerning sanitation in general and wastewater collection in particular. Case R2 residents were not well mobilized prior to or during project implementation. In contrast, residents in each of the other six cases were either well mobilized prior to the start of the project or mobilized effectively during implementation. These cases demonstrate the variety of ways in which people participated in mobilization activities for condominial sewer projects. Mobilization activities were used to express or to create demand for a project, to exchange information, to educate residents about the value of sewerage, and to give residents a forum to complain collectively about a project. Sometimes residents organized themselves, and at other times, they were mobilized by the implementing agency.16

We conceived of participation in decision making in terms of the extent to which residents took part in project-related decisions, such as choosing among backyard, front yard, or sidewalk condominial sewer layouts. In case R2, the case with poor performance, residents did not participate in any project-related decisions. Residents were not asked to sign, authorize, or accept the condominial sewer, and they were not involved in selecting the level of service (which corresponded with the tariff level) or the system layout. In contrast, residents in each of the six cases with good performance were involved in some aspect of project decision making. Residents in all cases except R2 were involved in one or more of the following key decisions:

- Deciding whether to connect to the sewer line;
- Selecting the type of service and tariff level;
- Deciding the layout of pipes and cleanout boxes;
- Selecting the materials of construction; and
- Determining which household facilities would be connected to the condominial sewer.

Participation in construction and maintenance work was measured based on whether beneficiaries contributed time, money, tools, materials, and labor for project construction

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Table 3. Interview questions for agency staff who implemented participation programs.

<table>
<thead>
<tr>
<th>Form of Participation</th>
<th>Interview Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobilizing</td>
<td>Were residents mobilized?</td>
</tr>
<tr>
<td></td>
<td>Did residents receive an orientation to the project?</td>
</tr>
<tr>
<td></td>
<td>Did residents receive education about sanitation?</td>
</tr>
<tr>
<td></td>
<td>Were user groups formed?</td>
</tr>
<tr>
<td></td>
<td>Did residents attend meetings?</td>
</tr>
<tr>
<td></td>
<td>Were residents visited in their homes?</td>
</tr>
<tr>
<td></td>
<td>Did residents receive project literature?</td>
</tr>
<tr>
<td>Decision making</td>
<td>Did residents decide the layout of the system?</td>
</tr>
<tr>
<td></td>
<td>Did residents decide to accept the service level?</td>
</tr>
<tr>
<td>Construction work</td>
<td>Did residents construct condominial sewers?</td>
</tr>
<tr>
<td></td>
<td>Did residents purchase materials?</td>
</tr>
<tr>
<td></td>
<td>Were houses connected to the condominial sewer?</td>
</tr>
<tr>
<td></td>
<td>Were residents responsible for constructing house connections?</td>
</tr>
<tr>
<td>Maintenance work</td>
<td>Did residents accept responsibility for maintenance?</td>
</tr>
<tr>
<td></td>
<td>Did residents perform maintenance?</td>
</tr>
</tbody>
</table>


Table 4. Interview questions for residents.

<table>
<thead>
<tr>
<th>Form of Participation</th>
<th>Interview Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobilizing</td>
<td>Did you participate in mobilizing residents?</td>
</tr>
<tr>
<td></td>
<td>Did you participate in project meetings with residents?</td>
</tr>
<tr>
<td></td>
<td>Did you participate in project meetings with agency staff?</td>
</tr>
<tr>
<td></td>
<td>Did you discuss the project with agency staff?</td>
</tr>
<tr>
<td></td>
<td>Were you involved in a sanitation education program?</td>
</tr>
<tr>
<td></td>
<td>Were you involved in a health program?</td>
</tr>
<tr>
<td></td>
<td>Did you respond to questionnaires from agency staff?</td>
</tr>
<tr>
<td>Decision making</td>
<td>Were you involved in selecting the layout for the project?</td>
</tr>
<tr>
<td>Construction work</td>
<td>Did you authorize project construction?</td>
</tr>
<tr>
<td></td>
<td>Did you contribute labor, money, property, tools, materials, etc.?</td>
</tr>
<tr>
<td></td>
<td>Did you construct your house connection?</td>
</tr>
<tr>
<td>Maintenance work</td>
<td>Who fixes your household’s condominial sewer when there is a problem, including paying for the expense?</td>
</tr>
</tbody>
</table>


a. Affirmative answers were further explained by agency staff to reduce ambiguity in the meaning of terms.
and maintenance, respectively. Residents from all seven cases participated in construction of their individual household connections, but they participated in different ways. Participation by residents in constructing household connections varied widely and took the following forms: doing the work by themselves, providing materials and having the sewer agency do the work, and paying plumbers to construct the connections. Residents participated in construction differently depending on several factors, including skill level, household income, time availability, and the prerogative of the implementing agency. Residents in all seven cases made formal commitments to participate in maintenance, but their actual participation varied depending on household income and the level of maintenance support that each received from the agency responsible for sewer maintenance. Even when residents tried to do maintenance, they often lacked the skills or tools to succeed and needed professional support from the responsible sanitation agency. Even though residents had previously agreed to handle maintenance on their own, many refused to do so because they believed that maintenance was the government’s responsibility.

Participation activities linked to mobilizing, decision making, construction, and maintenance were measured along three dimensions: (1) the scope of the activities, (2) the number of participants involved, and (3) the overall level of authority of the residents to initiate and control their participation activities. We measured participation along these three dimensions because we felt that important features of participation would be missed by using any one dimension alone. In some cases, for example, many participants showed up for project meetings, but the scope of how they could participate was limited. In this instance, participation in terms of number of participants scores high, but participation measured as scope of activities scores low. The third dimension (level of authority) contributes by recognizing that initiating action and taking control are the strongest manifestations of participation, regardless of the scope of the action or the number of residents involved. Without the use of multiple dimensions of participation, it would not have been possible to account for these types of distinctions.

We used responses from interviews with agency participation staff to determine the scope of the agency’s participation program for each of our case study projects (see Table 3). We employed responses from interviews with project area residents to estimate the number of participants who had engaged in each form of participation (see Table 4). We adapted an existing participation scale developed by Paul (1987) to assign scores to the level of authority exercised by participants in each form of participation (see Table 5). As a final step, we used Equation 1 to compute an index for each form of participation, expressed on an ordinal scale from 0 to 100; 0 indicated no participation, and 100 indicated the highest degree of participation possible with the selected set of participation measures.

\[
\text{Participation Index} = A \cdot w_A + P \cdot w_P + S \cdot w_S
\]

(1)

where: \( A = \) level of user authority (assigned using Paul’s scale) \( P = \) number of participants (responses from residents) \( S = \) scope of participation (responses from staff) \( w = \) weighting factor \( w_A + w_P + w_S = 1 \)

Participation index results reported here are based on calculations with the three weights in Equation 1 equal to each other. We used equal weights because we had no basis for valuing one dimension of participation more than any other.

<table>
<thead>
<tr>
<th>Form of Participation</th>
<th>Level of User Authority*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobilizing work</td>
<td>0. Little or no mobilization of users.</td>
</tr>
<tr>
<td></td>
<td>1. Agency mobilizes users.</td>
</tr>
<tr>
<td></td>
<td>2. Agency mobilizes users with assistance from community leaders.</td>
</tr>
<tr>
<td></td>
<td>3. Users mobilize themselves to respond to the agency.</td>
</tr>
<tr>
<td></td>
<td>4. Users mobilize themselves without seeking response from the agency.</td>
</tr>
<tr>
<td>Decision making</td>
<td>0. Agency selects service level and does not inform users.</td>
</tr>
<tr>
<td></td>
<td>1. Agency selects service level and informs users.</td>
</tr>
<tr>
<td></td>
<td>2. Agency provides service options to users.</td>
</tr>
<tr>
<td></td>
<td>3. Users select service level and seek agency approval.</td>
</tr>
<tr>
<td></td>
<td>4. Users select service level and do not seek agency approval.</td>
</tr>
<tr>
<td>Construction work</td>
<td>0. Little or no construction of house connections.</td>
</tr>
<tr>
<td></td>
<td>1. Agency constructs and informs users.</td>
</tr>
<tr>
<td></td>
<td>2. Agency constructs with user input.</td>
</tr>
<tr>
<td></td>
<td>3. Users construct with agency assistance.</td>
</tr>
<tr>
<td></td>
<td>4. Users construct without agency assistance.</td>
</tr>
<tr>
<td>Maintenance work</td>
<td>0. Little or no maintenance of condominial sewer.</td>
</tr>
<tr>
<td></td>
<td>1. Agency maintains and informs users.</td>
</tr>
<tr>
<td></td>
<td>2. Agency maintains with user input.</td>
</tr>
<tr>
<td></td>
<td>3. Users maintain with agency assistance.</td>
</tr>
<tr>
<td></td>
<td>4. Users maintain without agency assistance.</td>
</tr>
</tbody>
</table>

a. Participation scores (i.e., 0 = 0, 1 = 25, 2 = 50, 3 = 75, 4 = 100) were assigned based on the level of user authority determined from detailed case study descriptions presented in Nance (2004, apps. E and F). This scoring methodology was adapted from Paul’s (1987) 4-point scale of participation intensity.
Results

Participation Form and Project Performance

Performance scores for each case are listed in the last column of Table 2. Case R2 received a low sewer performance index (SPI) score of 12. Cases R1, N2, and N3 received mid-range SPI scores of 67, 66, and 55, respectively. Cases R3, N1, and N4 received high SPI scores of 71, 68, and 72, respectively. However, because the mid-range and high scores were clustered within a relatively small range (i.e., 55 to 72), the differences among them were not statistically significant (at $\rho \leq 0.05$) based on a nonparametric statistical test for ordinal data. Consequently, the seven cases were placed into two performance categories. Case R2 made up the poor performance category and the remaining six cases made up the good performance category.

The case study performance outcomes that we computed based on our detailed studies came as a surprise. At the outset of our study, we asked staff members to identify projects that performed particularly well and particularly poorly. Based on their views, we anticipated that at least two of the seven projects would rate as poorly performing projects, one each in Recife and Natal. In retrospect, our strategy did not account for two significant factors. One was the overall difference in condominial sewer performance in Recife and Natal. As explained below, Natal had a good citywide record of performance with condominial sewer projects; Recife’s record was mediocre at best. The second factor, which is detailed in Nance (2005), is that initial appraisals of performance by agency staffs we interviewed for purposes of case study selection did not accurately reflect how projects actually performed. This situation highlights the difficulties involved in selecting representative projects based only on the views of sanitation agency staffs. As a consequence of these two factors, we had only one poorly performing case among the seven selected.

On the basis of previously cited literature on community participation, we expected to find relatively high levels of participation associated with the cases in the good performance category and a low level of participation for the case in the poor performance category. But the overall participation results for these seven cases, illustrated in Figure 2-A, are not

![Figure 2. Levels of participation used in the seven cases.](image-url)
consistent with this expectation. As shown in that figure, all seven cases received mid-range scores for overall participation, ranging from 45 to 65 (with an average score of 52), despite the much wider spread in levels of performance among the seven cases.

A different view emerges if we disaggregate the concept of participation by breaking it into two parts: participation in mobilizing and decision making, and participation in construction and maintenance work (see Figures 2-B and 2-C). In Figure 2-B, the poorly performing case had a considerably lower level of participation in mobilizing and decision making compared to the cases with good performance. In Figure 2-C, both the best and worst performing cases (cases N4 and R2, respectively) had considerably higher levels of participation in construction and maintenance work compared to the other cases.

For these seven cases, participation in construction and maintenance work was not associated with condominial sewer performance, but participation in mobilizing and decision making was associated with performance. Our original hypothesis concerning the influence of participation might be restated as follows with regard to condominial sewer projects: higher levels of participation in mobilizing and decision making are associated with improved performance as measured by the condominial sewer performance index.

Significant Differences between Recife and Natal

At the time of our initial fieldwork (1994 to 1995), about 24 percent of Recife’s population was connected to the public sewer system, which included both conventional and condominial sewers. The majority of the population discharged sewage to on-site systems, storm drains, street gutters, or open ditches. A small portion of the collected sewage was treated, but most was released untreated and eventually flowed into Recife’s many canals and rivers. At that time, the city of Recife had a poor overall record of condominial sewer project performance, largely because of the ad hoc nature of project implementation by four different agencies. More than half of the forty-three condominial sewer projects implemented in Recife from 1980 to 1995 had less than fifty household connections each (Nance 2004). Many condominial sewer projects initiated during that time period were never completed, a large percentage of projects barely functioned, and most projects were not designed with a suitable destination for the collected wastewater. Although a few projects were successful, sanitation agency staff we interviewed unanimously characterized Recife’s overall performance in wastewater collection by condominial sewers as fair when choosing among the categories bad, fair, good, very good, and excellent. As one of our interviewees put it, “Sanitation is bad here in Recife.” It is notable that the two cases in Recife that exhibited good performance based on their SPI scores (i.e., cases R1 and R3) were uncommon outcomes.

Additional aspects of the institutional setting in Recife affected the process of implementing condominial sewer projects. We have already mentioned the coordination difficulties associated with having four different agencies involved in project implementation, particularly when those agencies chose not to cooperate. These problems were compounded because technical staffs within the agencies often differed in the degree to which they believed condominial sewer systems were a suitable technology for use in Recife. Differences also existed among agencies regarding the desirability of community participation in project implementation. Another important factor concerned the lack of alignment that sometimes existed between the goals of elected officials in Recife and the state of Pernambuco. During some years, officials at one level of government promoted the use of condominial sewers, but officials at the other level felt that condominial sewer technology was unsuitable. Under the circumstances, changes in elected officials at the state or city level could lead to funding disruptions in ongoing projects. For example, funding for a project promised by a mayor to a particular neighborhood might be cut off abruptly when a new mayor is elected. The logic of patronage and clientelism that is common in Brazil can easily preclude continuity from one regime to the next, and Recife experienced these disruptions in continuity for the period covered by our study (Nance 2004, chap. 5).

The circumstances in Natal were quite different from those in Recife. In 1995, approximately 20 to 25 percent of Natal’s population was connected to either conventional or condominial sewers, and about 90 percent of the condominial sewer connections served low-income and poor residents. As of 1995, Natal had a good overall record of condominial sewer project performance, which can be attributed to the efforts of a single sewer agency that was, on the whole, committed to the technology. The majority of projects initiated in the 1980 to 1995 period were either completed or in the process of being completed as of 1995 (Nance 2004). Most of these projects functioned adequately and released collected sewage to a suitable destination (e.g., a trunk sewer or a community septic tank). However, the sewage treatment plant, which was a single stabilization pond, was barely maintained. Agency staff we interviewed characterized Natal’s overall performance as good when choosing among the categories bad, fair, good, very good, and excellent. This characterization is consistent with results obtained by Watson (1995). The four cases in Natal that exhibited good performance based on their SPI scores were not extraordinary. Many condominial sewer projects in Natal performed well.
of our study. First, the agency had an overall plan for extending the trunk sewer network into Natal’s various sewer basins. Second, the agency had a standardized procedure for implementing community participation. This is reflected in Figures 2-B and 2-C, where, except for case N4, which is a high-income neighborhood, all the participation scores are nearly the same across the cases. This contrasts with the high variability in scores for Recife.

Another aspect of the situation in Natal relevant to our study is that for long periods during the 1980s and 90s, the mayor of Natal, the governor of the state of Rio Grande do Norte, and leaders of the state sanitation agency were aligned in their support of condominial sewer technology. This meant there were few disruptions caused by disputes between the city and the state over the desirability of condominial sewers and relatively few disruptions after new officials were elected (Nance 2004, chap. 6). Consequently, the state sanitation agency was able to make progress in implementing its plans for extending the trunk sewer network.

In contrast to Natal, most of the condominial sewer projects in Recife performed poorly. The fact that the few well-functioning condominial sewers in Recife were located in neighborhoods having relatively high levels of influence on political officials and agency staffs led us to examine how communities sometimes influenced project outcomes by taking actions outside of an agency’s formal participation program.

### Table 6.
Estimates of the levels of community influence in the seven case studies.

<table>
<thead>
<tr>
<th>Form of Influence</th>
<th>Good Performance</th>
<th>Poor Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R1</td>
<td>R3</td>
</tr>
<tr>
<td>Organization^a</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Relationships^b</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

**Source:** Nance (2004).

*a. Statements by residents were used to determine the existence of a neighborhood association and a representative community leader(s) at the time the project was implemented. This characteristic was judged positive if a neighborhood association and leader were present.

b. Statements by residents were used to determine the presence or absence of relationships with officials. This characteristic was judged positive if relationships were present.*

One form of participation outside of the participation programs run by sanitation agencies involved residents exerting influence by exploiting their relationships with influential actors. Community residents with personal, business, political, or familial relationships with public officials, agency staffs, or politicians often have the potential to use these relationships to exert significant influence. As is commonly known in Brazil, “getting a job as a janitor in a public building, as a garbage collector, a teacher . . . frequently depends on political contacts.” (Mainwaring 1999, 182). The benefits of influence created by personal relationships and other ties can spread to an entire neighborhood when the ties are used for projects that serve that neighborhood.

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A second way in which communities can exert influence outside of agency participation programs is based on their ability to organize. Communities that are well organized have the potential to bargain effectively with elected and appointed officials, for example, by assembling blocs of votes for a candidate promising urban services. Effective neighborhood organizations and grassroots popular movements became important in the 1980s in Brazil (during and following the democratic transition), when neighborhoods first mobilized against the authoritarian military regime and then organized to press for citizenship, which included the right to receive basic urban services (Hochstetler 2000; Mainwaring 1989). Residents can use...
the influence created by organizing to bring condominial sewer projects and other urban services into their neighborhoods or to improve the quality of service provided by public agencies.

Table 6 shows our estimates of the ability of each of the seven communities involved in our study to exert influence by taking advantage of connections to officials or by using their ability to organize. As indicated in the notes to Table 6, we relied on interview results in making the judgments reflected in the table. In gauging organization in the table, we relied only on whether a neighborhood association and a leader for the association were present. Population size is linked to the ability of a community to deliver votes in exchange for projects in the sense that larger communities would potentially have more votes to deliver. In the opinion of staffs at the sanitation agencies, three neighborhoods in our study would be considered to have relatively large populations: cases R3, N2, and N3.26 We use this information on population size below in interpreting how influence was exerted in some communities. Although the socioeconomic characteristics of a neighborhood may have an implicit bearing on whether residents have relationships with elected and appointed officials, we relied on our interviews to judge whether any such relationships were in fact exploited in the context of the condominial sewer projects.

Community Influence and Project Performance

In presenting our results from examining two additional forms of participation that we identified above as community influence, we first consider the four case studies in Natal (see Table 6). Three of these four projects were located in neighborhoods where communities neither exerted influence via their personal relationships nor by using their ability to organize and thereby pressure local officials. These types of influence were only present in case N4. However, there was no significant variation in the performance of these four condominial sewer systems (at $p \leq 0.05$). This suggests that there was little need for a community to exert influence outside the sanitation agency’s participation program to obtain a good project in Natal. This is consistent with the state sanitation agency’s systematic use of community participation. From the perspective of investigating community influence, Recife’s situation is more interesting because there is more variation among the cases and because the four sanitation agencies operating in Recife utilized ad hoc approaches in implementing condominial sewer projects.

Our analysis of the cases in Recife demonstrates that in cases R1 and R3, residents took action beyond the sanitation agencies’ community participation programs in an effort to obtain better project outcomes. In case R1, which involved a middle-income community, residents received relatively high levels of maintenance service by the sewer agency.27 In interviews conducted with residents in the project area, we learned that several residents had political ties to a local official who had served as mayor and governor; the residents also had ties to his political party. In addition, some residents reported having connections with staff of COMPESA, the agency that implemented the project. Moreover, some COMPESA staff lived in the case R1 project area. During fieldwork in the case R1 neighborhood, we observed that this condominial sewer project received unusually consistent maintenance attention from COMPESA (compared to other project areas in Recife). On several instances, we observed COMPESA staff fixing problems inside homes, which was highly unusual because residents were responsible for their in-home plumbing, fixtures, and house connections. Forty-one percent of residents interviewed for case R1 reported that COMPESA fixed their household condominial sewer whenever there was a problem. Although it is difficult to trace the causal process, these outcomes for case R1 suggest the possibility that the existence of these ties to government officials and COMPESA may have affected the delivery of maintenance services, with consequent effects on project performance.

Case R3 demonstrates a clear linkage between condominial sewers and community influence prior to project implementation. In this case, a large population of poor residents had initiated an occupation of vacant land (known locally as an invasion, or invasao) for the purpose of establishing a new community with urban services. This occupation was coordinated with the campaign to reelect a populist governor for the state of Rio Grande do Norte. During this governor’s first term in the early 1960s, there had been a large invasion of poor citizens into a different neighborhood (Green Garden, a pseudonym). The governor had provided Green Garden citizens with legal tenure and infrastructure services. Residents of the case R3 occupation created a neighborhood organization called the Comissão de Ocupação (Occupation Commission) to represent their interests in negotiating for service similar to that received by the community that had invaded the Green Garden area. The commission’s tactics for exerting influence included assembling the votes of the community and negotiating with the state government for an urbanization project. The new governor, who was elected in 1986 and took office in 1987, included the case R3 area in his statewide favela (shantytown) urbanization program, and this is the program under which the case R3 condominial sewer was installed.

Residents we interviewed reported that politicians always visited the case R3 area just before election time, and they continued to do so years after the urbanization project was fully implemented. The Occupation Commission was disbanded in 1990 after the project was completed but, as of 1995, the community had not stopped exerting influence on officials. During our interviews with the president of the case R3 neighborhood association, he reported that he continued to meet every month with officials of the state sewer agency to complain and call attention to his community’s ongoing water and sewer maintenance needs. We observed state sewer agency staff fixing sewer problems in the case R3 area on several occasions during our fieldwork.
In contrast with case R3, residents of the case R2 project area exerted no influence. Indeed, they had no potential influence to exert (see Table 6). Even though case R2 residents participated in construction and maintenance of the condominial sewer system, their project was essentially ignored by the sewer agencies. Project funding was insufficient, the project design was impractical, and project changes made during construction were poorly controlled. In short, problems with the case R2 condominial sewer were discovered soon after the project was installed, and nothing was done to correct them. Instead, the maintenance agency abandoned the project. Although residents complained, they lacked the ability to exert much influence because they had no personal relationships to exploit. Moreover, even if the community had tried to organize votes (as in the case of R3), the population of the neighborhood was so small that this might not have had much effect.

The two cases of success in Recife were exceptions to that city’s overall record of poor performance and, therefore, these cases offer insights into how good performance was achieved in that city. In contrast to the situation in Natal, it appears that communities in Recife had to organize effectively and use ties to influential political actors to gain leverage on the agency that delivered sewer services. In Recife, the two communities with good condominial sewer performance obtained this good performance as a result of exerting influence to gain leverage.29

**Discussion**

How well does participation explain variations in the performance of condominial sewer projects in Recife and Natal? We found that this question cannot be addressed without distinguishing among several different forms of participation. Different forms of participation within stages of the project cycle do not appear to be equally associated with performance, and the ability of a community to exert influence outside of an agency’s formal participation program is a form of participation that was significant in Recife.

Consider the four forms of participation in the agencies’ community participation programs. Two cases with significantly different outcomes, case N4 (good performance) and case R2 (poor performance), each had comparably high levels of participation in construction and maintenance work. The remaining cases, all with good performance, achieved mid-range levels of participation in construction and maintenance. This finding does not support the view that increased participation in construction and maintenance work is associated with enhanced performance. Furthermore, cases N4 and R2 had significantly different levels of participation in mobilizing and decision making. For these two forms of participation, the case with good performance (N4) had mid-range participation, and the case with poor performance (R2) had very low participation.29 Mid-range levels of participation in mobilizing and decision making were similarly associated with good performance for the remaining cases. This finding led us to hypothesize that participation in mobilizing and decision making is associated with enhanced condominial sewer project performance.

Of course, these associations are only suggestive. Generalized causal relationships between variables cannot be established with the small sample size used in this study. The above observation about the significance of mobilization and decision making forms of participation is, however, consistent with overall findings in the literature on demand-responsive projects (e.g., Sara and Katz 1997). This consistency is based on the view that a high level of involvement in mobilization signals a strong demand for a project.

We also found that in some localities, the ability of communities to use their connections to agency staffs and political figures and their ability to organize (e.g., to demonstrate in large numbers or to deliver votes as leverage) was at least as important as engagement in participation programs run by sanitation agencies. This was observed in Recife, which had a relatively poor overall performance record with condominial sewer projects. The two cases with uncommonly good performance (cases R1 and R3) involved communities that exerted influence, which contributed to good sewer service. Conversely, the case with poor performance (case R2) involved a community that lacked connections to officials or the ability to organize effectively to press its case for good sewer services.

Our results raise questions about the validity of general claims that more community participation will lead to better project outcomes. From the perspective of affecting performance of a condominial sewer project, when and how community participation occurs are significant. Arguing that community participation must be viewed in a nuanced fashion is, of course, nothing new. This was a position taken more than three decades ago in a widely cited article by Arnstein (1969), in which she presented a ladder of participation, a framework that was later adapted by Paul (1987) for projects in developing countries. The arguments herein reinforce Arnstein’s position by demonstrating the relative importance of different forms of community participation.

Our findings concerning differences between community involvement in an agency-run program and participation that exerts influence on political officials and agency staffs indicate that our initial conceptualization of participation was too restrictive. When we began the study, we were concerned only with participation as it occurred through programs designed by agencies. At that point, we failed to give sufficient attention to how communities, by exploiting various ties to influential actors or by organizing effectively, could shape the performance of sewer services.

In expanding our view of participation to include the way communities utilize relationships to officials and agency staffs
and their ability to organize effectively, our explanations of case study results became richer. This broadened view of participation, together with an appreciation of the different institutional settings in Recife and Natal, helps place the role of participation in agency programs in context and provides a more complete understanding of the role of community participation in affecting project performance.

► Conclusions

Our results for Recife and Natal demonstrate that differences between the highest and lowest levels of condominial sewer project performance can be small in one city and large in another and that both project-level and city-level information is needed to understand and explain these differences. Also, after distinguishing among different forms of community participation, we find that not all forms of participation are equally influential in delivering successful condominial sewer service. In particular, for agency-organized participation based on phases of the project cycle, we find that only two forms of participation—mobilization and decision making—are positively associated with project outcomes. This assertion is a tentative hypothesis that can be subject to further investigation.

We also find that people’s involvement in agency-organized forms of participation is not the only type of participation relevant to explaining outcomes. Communities can affect outcomes by exerting influence through their relationships with community officials and by organizing to make a stronger case for good service with agency staffs and elected officials. A community’s ability to organize effectively may also allow it to assemble votes or to attract media attention through demonstrating, thereby gaining leverage with officials. Our findings suggest that participation in agency-run participation programs is not always a significant driver of success and that forms of community participation external to the project can have more significant effects on project outcomes.

The successful co-production of condominial sewers requires an engaged sanitation agency as well as involved residents, and where an appropriate balance is not achieved, such as in Recife, communities with potential to exert influence will act to obtain better service. Explicit attention to alternative forms of participation, including participation outside of agency-run participation programs, will help planning practitioners and development scholars better understand the range of venues needed for communities, agencies, and officials to move forward in creating successful sanitation projects.

In summary, our study provides the following: (1) a re-conceptualization of the relevance of participation as an aspect of the co-production of urban infrastructure, (2) a technique for measuring participation in the context of the project cycle, (3) empirical evidence suggesting a limited impact of the construction and maintenance forms of participation (i.e., participation vis-à-vis contributions) on sewer system performance, (4) empirical evidence of a potentially significant impact of the mobilization and decision-making forms of participation (i.e., participation vis-à-vis involvement in decision making) on system performance, and (5) insights into how the organizational and relational forms of participation (i.e., participation vis-à-vis exertion of influence) can affect sewer system outcomes.

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► Notes


2. The terms co-production and participation (shorthand for community participation) are used interchangeably in this article and in the literature (Joshi and Moore 2004; Ostrom 1996; Whitaker 1980; Brudney and England 1983; Rich 1981).


4. We were also guided by Ostrom’s (1996) analysis of co-production in condominial sewers and Watson and Jagannathan’s (1995) analysis of participation in the water and sanitation sector.

5. Differences in institutional inputs and approaches to implementation beyond the neighborhood level are more fully addressed in separate publications (see Nance 2004, 2006). In these publications, Nance argues that project performance is primarily a function of the strength and stability of a project coalition composed of the relevant agencies, officials, and beneficiaries associated with an individual project. Projects perform better in a context that supports the creation of strong, stable project coalitions. Decentralization of Brazil’s sanitation sector during the 1980 to 1995 period tended to destabilize and weaken the condominial sewer project coalitions that developed, even as democratization resulted in increased participation, enhanced community influence, and more innovation by implementing agencies. Recife quickly decentralized its implementation of participatory sanitation projects, but its ad hoc approach was associated with weak project coalitions that did not achieve good performance in the majority of the projects that were implemented during the time period. Natal, however, maintained a systematic, centralization of implementation approach for a longer period. Strong and stable project coalitions formed more readily around this centralized participatory model, initially resulting in a better overall performance record than Recife.

6. Although some recent observations are provided (see the notes to Table 1), changes to the case study neighborhoods over time have no bearing on the analysis presented in this article, which covers the implementation periods of selected case study projects and measures the performance of these projects approximately five years (on average) after implementation.

7. Our study does not address condominial sewers in small-to medium-sized cities, towns, or rural areas.
8. Examples of sources from this literature are Glaser and Strauss (1967), Yin (1994), Ragin (2000), Patton (2002), and George and Bennett (2005).

9. Based on the provisional judgments reflected in Table 1, there is no obvious association between participation and performance. A slight majority of projects had good participation in the opinion of knowledgeable practitioners, but performance was equally distributed among the categories. These trends in perception appear to be similar for both cities based on the information in Table 1.

10. Our reasoning has a resemblance to the “indirect method of differences” elucidated by John Stuart Mill ([1843] 1967). The difference is that reasoning used by Mill involved cases selected in sequence. To see the linkage to Mill’s description, consider that the “effect” is a good condominial sewer project and that the “cause” is good community participation in an agency-run participation program. Using the indirect method of difference, the researcher first examines “instances of the effect to see if they all agree in displaying the same antecedent condition . . .” The researcher then examines “instances of the cause to see if they all agree in displaying the effect . . .”

11. On this point, note the views of Glaser and Strauss (1967): By maximizing or minimizing difference among comparative groups, the sociologist can control the theoretical relevance of his data collection (p. 55) . . . [T]he sociologist cannot cite the number and types of groups from which he collected data until [emphasis in original] the research is completed (p. 50).

12. Researchers of large-N quantitative studies believe that sample selection on both outcome and explanatory variables simultaneously can lead to incorrect inferences; however, this assumes that samples are the same as cases, an assumption that is not necessarily true in small-n qualitative studies such as ours. Yin (1994) expressed this point well as follows: “Cases are not ‘sampling units’ and should not be chosen for this reason. . . . The cases should serve in a manner similar to multiple experiments, with similar results . . . or contrasting results . . . predicted explicitly at the outset of the investigation” (pp. 31, 51). In our study, projects were more like experiments rather than normally distributed homogeneous sampling units. Recife had many small projects with a higher level of performance failure and inconsistent participation, and Natal had fewer large projects with a lower level of performance failure and more consistent participation. Knowing this about our population of projects ruled out the possibility of meeting the assumptions of a quantitative sampling logic. Consequently, we used qualitative case study logic to select projects based on “explicit predictions” of participation and performance. Further discussion about the rationale for selecting cases in small-sample qualitative research designs is available in Collier and Mahoney (1996) and Ragin (1997).

13. From the resulting sample sizes, the corresponding confidence intervals ranged from ±10.5 percent to ±13.5 percent per case study (at p ≤ 0.10, where p is the level of statistical significance).

14. All of the interviews for this research were conducted (in Portuguese) by the senior author and her Brazilian research assistants.

15. For more information about this methodology for measuring participation, see Nance (2004, app. D).

16. See Nance (2004: appendices E and F) for case-by-case descriptions of how people were involved in the various forms of participation.

17. Our study did not examine the possibility that participation in construction and maintenance work was associated with other measures of performance such as cost recovery.

18. We began our study with the following hypothesis: higher levels of participation are associated with improved performance as measured by the condominial sewer performance index. This initial hypothesis did not disaggregate participation into four forms.

19. Interview with informant 29, COMPESA operations and maintenance coordinator; interviewed by Nance, December 6, 1994, Recife, transcript.

20. Our characterization is supported by the findings of a World Bank-commissioned survey of condominial sewer experience conducted by Watson (1995). Her study investigated and compared the condominial sewer experiences of seven Brazilian cities: Brasília, Recife, Natal, Cuiabá, Joinville, Petrolina, and Itapissuma. The sample of cities chosen for the investigation included two-thirds of all known condominial sewer connections at that time (52,550 out of 75,000 total connections). The seven cities represented sixty neighborhoods; however, cities were used for the unit of analysis, so there was no evaluation of individual neighborhoods. In the study, the overall record of condominial sewer performance in Recife was characterized as “less than satisfactory,” based on a three-category scale of good, average, and less than satisfactory. Watson found that some projects were operating well even in the badly performing cities of Recife and Cuiabá, and that all cities had some problems.

21. This result is based on the average response of eight agency staff members to the question, “How would you evaluate the overall performance of condominial sewers in Recife?” Possible answers were based on the following 5-point scale: 1-Poor, 2-Fair, 3-Good, 4-Very Good, 5-Excellent. The interviews were conducted in Recife in March 1995.

22. Interview with informant 100, president of an engineering company; interviewed by Nance, March 19, 1995, Recife, transcript.

23. Interview with informant 1, engineering consultant and former city official (Recife) and former state official (Pernambuco); interviewed by Nance, December 1, 1994, Recife, transcript.

24. This result is based on the average response of five agency staff members to the question, “How would you evaluate the overall performance of condominial sewers in Natal?” Possible answers were based on the following 5-point scale: 1-Poor, 2-Fair, 3-Good, 4-Very Good, 5-Excellent. The interviews were conducted in Natal in 1995.

25. For additional evidence and more in-depth discussion about the differences in condominial sewer implementation in Recife and Natal during this time period, see Nance (2004).

26. The size of the project population was estimated as the number of households in the project area times the average number of people per household. We left it to local condominial sewer practitioners to gauge whether a particular population was considered large.

27. In case R1, the existence of good topography, supporting infrastructure (e.g., piped water, pavement, and drainage infrastructure), and lower density (e.g., fewer houses per block and fewer residents per house) also contributed positively to the functioning of the sewer system.

28. See Nance (2004) for additional evidence and detailed explanations of why community influence was more important in Recife than in Natal for the condominial sewer sector.

29. At first glance, one might imagine that the residents of case R2 predicted the future failure of their project or anticipated its abandonment by the sewer agency and therefore refused to participate early on in project mobilizing and decision making. But interviews with residents and with the design engineer show that this is not the case and suggest that residents would have participated if given the opportunity. Most residents reported that there were no opportunities for involvement in the project. The engineer reported that his original scope of work did not include resident involvement or work with the community and did not include a budget for hiring participation staff. In the field, residents were only spoken to in a limited way every now
and then regarding the location and layout of the system, which
was being implemented in their neighborhood without their
involvement by a city agency that did not embrace participation
in its implementation approach. At the time, a nonparticipatory
implementation approach was the norm. After project operation
began, residents mobilized over an extended period of time to
complain to city and state agencies about poor system perfor-
mance, including attending community meetings, making verbal
complaints, making written complaints, and collecting signa-
tures. Both residents and city staff expressed surprise and outrage
that the state agency responsible for maintenance had aban-
doned the project.
30. The study on which this article is based covered the period
31. These results contribute to the emerging literature on the
limits of participation (e.g., Khwaja 2002, 2004; Cooke and
Kothari 2001)

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