



Virtual Audits and Other Novel Alternatives to On-site Data Collection in Hard-to-Reach Communities

November 3, 2022

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[RESILIENT]

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Agenda



- **Introduction:** Why virtual?
- **Background:** What were the goals for each study where we piloted virtual methods?
- **Data collection methods:** What methods did we try? Which worked? Which failed?
- **Recruitment methods:** What populations could we recruit? Which recruitments methods worked better?
- **Comparison of data collection methods:** How did they compare for data quality and cost?
- **Recommendations:** When are virtual methods appropriate? How could they be used to increase DEI?



Introduction




- In 2020, Covid-19 drove two studies to virtual methods
- Both studies captured data in primarily hard-to-reach households
 - Included low-income, rural, mobile homes and multifamily buildings
- Result: Virtual methods were overall successful
- Use these two projects to consider:
 - Should virtual methods be incorporated into the *new normal* for data collection?
 - If so:
 - When should virtual methods be considered post-pandemic?
 - What are best practices for virtual methods?
 - Can virtual methods increase diversity, equity, and inclusion (DEI) in evaluation studies?



Background



Study	Purpose	Type of Data Collected	Sample Size
San Joaquin Valley (SJV) Baseline Study	Establish baseline conditions of homes in SJV, California	Residential energy assessment, including building information, major building systems, and data on home's end uses	259 homes, including 154 income-eligible for utility bill assistance
 Multifamily Impact Study	Conduct impact evaluation for multifamily utility programs	Verification of in-unit, common area, and exterior equipment installed through utility programs	80 multifamily buildings, including 56 income-eligible



Data Collection Methods

Overview: All Methods Attempted



Study	Scope	Method
SJV Baseline Study	Whole home audit	Videoconference Photo submission
Multifamily Impact Study	Common Area HVAC and DHW Equipment	Photo submission Videoconference
	Common area lighting	Brief phone interview
	Dwelling Unit Measures	Photo submission Videoconference

Gray text indicates methods that didn't work due to recruitment challenges.
Dwelling Unit Measure verification was conducted using file review.

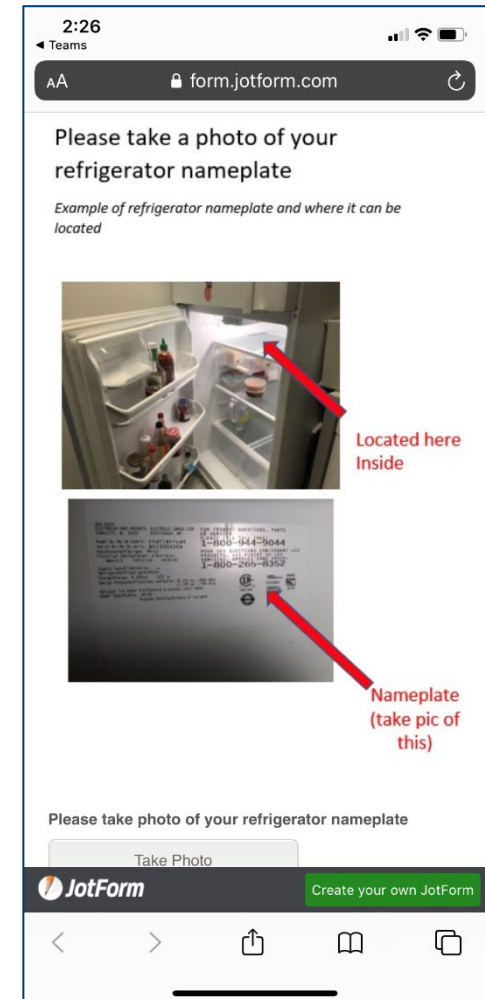


Data Collection Methods

Highlights: Photo Submission



- Email: Asked customer to send specific photos (e.g., refrigerator nameplate)
- Online platform: JotForm, pictured at right
- These were used as (Multifamily Impact) standalone methods or (SJV) to supplement videoconference if wifi dropped or for exterior photos for evening audits

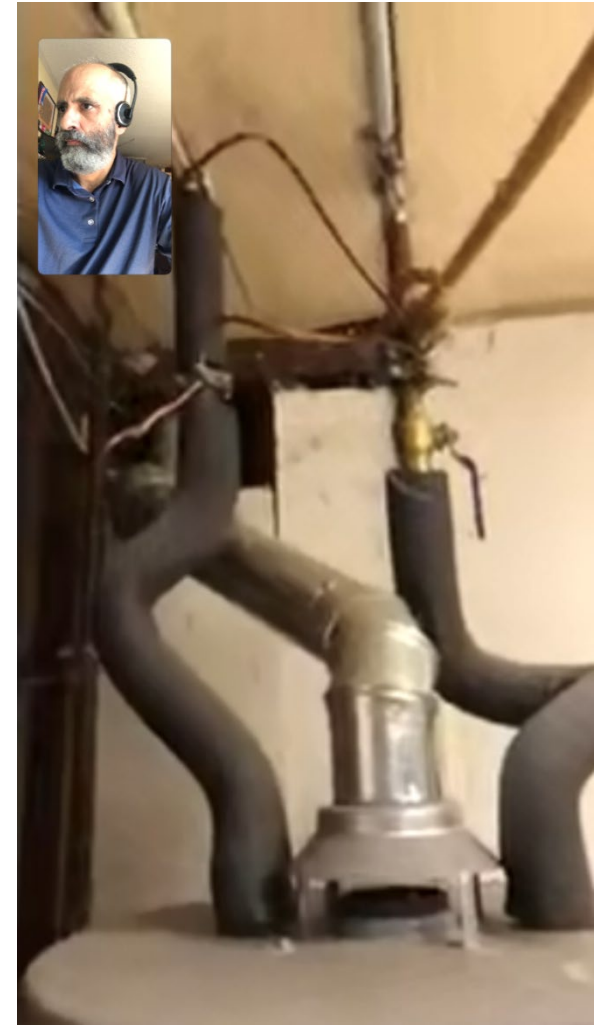


Data Collection Methods

Highlights: Videoconference



- Research Team guides customer to:
 - Show relevant appliances, envelope
 - Pan to show context
 - Zoom into nameplates
- Team primarily used Microsoft Teams, with options for other platforms



Recruitment Methods



Study	Participant	Outreach Method	Data Collection	Incentive
SJV Baseline Study*	Resident	Phone, email	Videoconference	\$100
Multifamily Impact Study	Resident	Postcards	Photo submission	\$25
	Property Manager	Phone, email	Photo submission or videoconference	\$200
			10-15 minute phone interviews to verify measures still operating	\$75

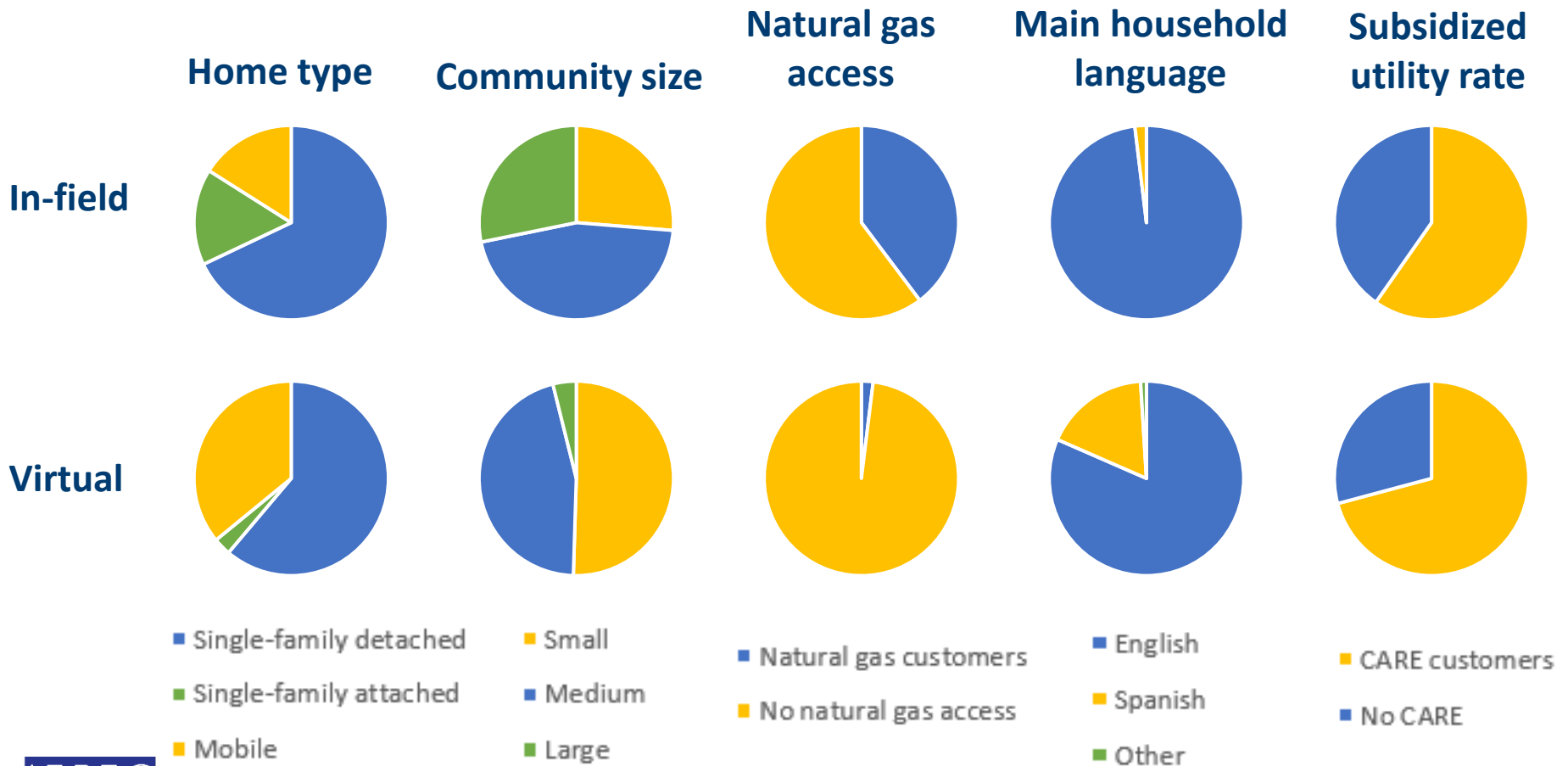


* Partnered with community-based organization for recruitment

Profile of Recruited Customers



SJV Baseline Study



We contacted most hard-to-reach customers after the move to virtual methods, but recruitment continued to be successful

Comparison of Data Collection Methods – Recruitment & Acceptance

Multifamily Impact Study



Data Gathering Method	Incentive	Recruitment Success: Completions out of customers contacted
Common Area: Property manager photo submittal	\$200	Moderate: 28 of 80
Common Area: Property manager 15-minute interview to verify installation and operation	\$75	Minimal: 8 of 80
Common Area: Property manager videoconference	\$200	Minimal: 1 of 80
Common Area: Photo submittal	\$200	Not effective: 0
In-Unit Measures: Postcards requesting photo submittal or video conference	\$25	Minimal: 3 of ~500



Comparison of Data Collection Methods – Data Quality



Videoconference

Type	Feasibility	Quality	Quality compared to in-field
Appliances Basic Characteristics	●	●	Same
Appliance Nameplate	●	◐	Can be same
Presence of Supplementary Equipment	◐	●	Can be same
Exterior Equipment	●	◐	Can be same
Smells	○	N/A	Low
Condition Assessment of doors, windows, roof	○	◐	Medium



Comparison of Data Collection Methods – Data Quality



Multifamily study methods: phone interview, photo submittal

Location	Measure Type	Remote Verification Feasibility	Remote Methods Expected Data Quality	Summary
Common Area	Cooling, Heating, DHW Systems	●	◐	✓
	Wi-Fi Thermostats	●	●	✓
	Common Area Lighting	◐	◐	○
	Attic Insulation	●	●	✓
	Low Flow Fixtures	○	○	✗
In-Unit	In-Unit Lighting	◐	◐	○
	Refrigerator Replacements	○	●	○
	Window Replacements	◐	◐	○



Comparison of Data Collection Methods – Cost Estimates



Additional costs per site

	Virtual	In-Field
Travel	-	\$157 – \$315
Assisting Customer in prep	\$28	-
Audit length	\$35	-
Additional Rescheduling	\$28	-
Data collection tool development	\$28	-
Total	-	\$39 - \$197



Cost difference varies hugely depending on travel needed for in-field data collection

Recap of Main Findings



- Virtual methods can be used successfully in certain evaluation / market research applications
- Recruitment:
 - Successfully recruited residential customers to participate in virtual whole-home audit
 - Included 71% low income – including 20% of lowest income bracket, and 18% Spanish-speaking customers
 - Mixed success with multifamily facility managers to provide photos or interviews for measure-level verification
- Data quality
 - Most measures can be verified rigorously using videoconference and photo submittal. Smells and low flow-fixtures are exceptions.
- Comparison of virtual with in-field methods
 - Estimated costs show virtual about same cost if 30 min. between sites, and cheaper if 60 min. or more between sites
 - Recruitment differences unknown. Neither study compared recruitment for virtual vs. infield within the same populations



When to Use Virtual Methods and DEI considerations



- Best applications of virtual:
 - Large geographic region or considerable travel, OR
 - Only need few pieces of information (e.g., a few photos)
- Virtual methods allow for more scheduling flexibility, both for auditors and participants (easier for evening or weekend audits)
 - Encourages more diverse participants
 - Spanish speaking auditors can cover larger territory, or translators can join at low cost
- Consider wi-fi penetration and smart phone access of target population
 - 2% of Californians lack access to high-speed wireless.* This is a relatively small fraction, but many are in disadvantaged communities
- Residential customers, including low-income, are diverse.
 - Different customers will prefer different methods
 - Best to offer customers multiple participation options (e.g., photo submission or videoconference) if budget and data needs allow

* Source: <https://broadbandnow.com/California>



Best Practices for Virtual Methods



Data Collection Method	General	Recommended Applications
Videoconference	<ul style="list-style-type: none"> • Work with a local CBO to recruit hard-to-reach customers • Offer multiple platform options • Provide numerous reminders, since customer “no shows” are frequent • Ahead, review an online mapping platform to get oriented with the property • Script instructions for consistent, comprehensive data collection • Record video if participant allows, for QC or to review equipment plates not captured well in screenshots 	<ul style="list-style-type: none"> • Data collection directly from residents, or • Data collection requires viewing many areas and appliances
Photo Submittal	<ul style="list-style-type: none"> • Allow options for email or text 	<ul style="list-style-type: none"> • Data collection on only a few pieces of equipment
Phone Interview	<ul style="list-style-type: none"> • Use in combination with file review 	<ul style="list-style-type: none"> • Measure verification where equipment plate is not critical (e.g., lighting)



Questions?



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Thank you for listening

