**Using Every Door Direct Mail Web Push Surveys and Multi-level modelling with Post Stratification to estimate Perceptions of Police at Small Geographies**

**Summary of Proposal**

We propose using the United States Postal Service of *Every Door Direct Mail* (EDDM), in combination with push web surveys, as a cost-effective mechanism for police agencies to generate survey responses persistently over time with effective geographic coverage of small areas.

This is a **non-probability sampling** approach, in which a police department would submit a mailer (such as a postcard) along a particular postal route, with a link or QR code to provide responses to a web-based survey.

Postal routes are relatively small geographic areas, typically covering a few hundred residences, which can directly identify the spatial location of the survey taker. One can then use these micro level identifiers to build spatial models that can take into account differential response rates using *multi-level regression with post-stratification* (MRP).

We believe this is the *best* approach to meet the stated goals of the NIJ *Innovations in Measuring Community Perceptions Challenge*.

* This approach is ***representative***. Web based push surveys tend to have better response rates for younger individuals compared to direct telephone surveys (Dillman, 2017; Grubert, 2019; Rosenbaum et al., 2015).
* This approach is ***cost effective***. Our appendix estimates a cost of $7.25 per completed survey. It will not rely on needing to hire additional labor to conduct in-person canvases.
* This approach is ***accurate across micro-geographies***. Using MRP can take local estimates of demographic proportions, and reweight survey estimates to properly estimate average attitudes in small geographic areas (Gelman et al., 2017; Wheeler et al., 2020).
* This approach can be done ***frequently***. Unlike in person canvasses that are labor intensive, this only requires setting up an online survey and dropping off mailers to USPS (in bulk).
* This approach is ***scalable***. The EDDM service by the USPS is available in the entire United States. It requires very little upfront capital (to print the mailers). The labor to implement is small (just dropping off the mailers to the USPS).

We further describe the necessity and challenge of measuring community perceptions of police at micro geographies, and why we believe our approach is the most rigorous and feasible compared to other methods.

***The Necessity and Challenge of Measuring Perceptions at Small Geographies***

Like hotspots of crime, there is micro-level variation in attitudes towards police (Wheeler et al., 2020). If one wishes to improve attitudes towards police in these areas, it will be necessary to use methods to accurately estimate those perceptions at small areas. If there are micro locations with negative sentiments towards police, averaging perceptions over larger areas, such as entire cities or larger neighborhoods, as is traditionally done in social science research (Raudenbush & Sampson, 1999), will ultimately result in misleading estimates.

The challenge comes amidst declining response rates to traditional polling methods, in particular telephone surveys (Dillman, 2017).

***Using EDDM to gather a Non-Probability Sample***

EDDM is a method to send mailers, such as postcards or letters, to every individual in a single mailing route (Grubert, 2019). Mailing routes are smaller than zip-codes, typically fewer than 1000 residential addresses per area (after often only a few hundred addresses). As such, they are smaller geographic areas than zipcodes but larger than street segments.

Before discussing specifics of EDDM, it is worth briefly describing alternative methods to obtain survey measures and why we believe these options are not viable options for accuracy or cost-effectiveness. These include two different modalities – cell phone telephone surveys and in-person canvas surveys.

Telephone cell-phone surveys in our experience do not generate as accurate estimates of micro-level areas. Wheeler et al. (2020) find that for a random digit dialing survey in which they additionally asked respondents to list their nearest intersection, over 25% refused to answer the question, and an additional 13% provided either ungeocodeable or addresses not in the city of interest. While some firms offer polling at the zip-code level, given the mobility of individuals it is very difficult to tie cell phone numbers to particular geographic locations.

An important cost in estimating surveys that rely on human labor are costs per individual doing the survey. As such, even without the data quality issues, telephone surveys can be very costly, typically taking several hours of interviewer time per completion of a single survey (Guterbock et al., 2018). Thus estimates of survey costs per survey completion for cell phone surveys, when including labor cost estimates to conduct the survey, are typically over $30.

While we are unaware of similar cost estimates for in-person canvasses, we suspect they will be *higher* than telephone surveys in terms of labor costs. For example, Fontaine et al. (2019) used teams of 8-12 people over two weeks to gather approximately 200 surveys over several sites. An estimate then is a single canvasser generated approximately 25 survey responses over two weeks. While Fontaine et al. (2019) does not list time spent in the field for canvassers, it seems unlikely they would gather more than a few surveys per day.

As such, we consider both of these approaches non-starters for police departments wishing to conduct persistent surveys with widespread and accurate geographic coverage. Although prior academic projects have used individuals to conduct in person canvas interviews in hotspots of crime (Haberman et al., 2016; Kochel 2018; Koper et al., 2022; Weisburd et al., 2023), we are unaware of a single city using this approach over time (without one time funding from outside resources). It would require hiring multiple persistent positions to conduct the surveys, given salary and fringe for such full time positions, they will ultimately be very costly to conduct a regular survey using either of those methods.

In comparison, we are familiar with cities enlisting outside firms to conduct semi-regular surveys. For a single example, the city of Raleigh, North Carolina pays a firm approximately $60,000 every other year to conduct a more general survey on community opinions of public services the city offers (see <https://cityofraleigh0drupal.blob.core.usgovcloudapi.net/drupal-prod/COR11/fy22-program-catalog.pdf>, page 122 for example).

Our budget estimates (see the Appendix) $7.25 per completed survey using the EDDM approach. Thus with a budget of under $10,000 per year, a city can generate over 1000 survey responses.

***Why MRP is necessary to make an accurate map of survey attitudes***

Multilevel regression with post stratification (MRP) is a commonly used technique to weight and adjust surveys for non-response bias as well as to generate small-area estimates. MRP is often used in public opinion or political polling where the samples are often drawn from the state level, but inferences are desired at the county level. Obtaining reliable estimates from surveys at smaller geographic areas present two problems: (1) responses to the survey are often not representative of the population of interest and (2) survey estimates for sparsely populated strata are highly variable or undefined using conventional methods. MRP handles both issues by combining survey post stratification with Bayesian multi-level regression. In brief: the outcome of interest is first estimated using a multi-level regression that includes the demographic strata, auxiliary variables, and random effects for the strata of interest. This is useful because Bayesian methods allow more sparsely populated strata to “borrow” information from other strata via partial pooling (Gelman, et al., 2013). This has the distinct advantage of allowing for estimates for strata which are not even observed in the original survey. In the second step the estimates from the regression model are post stratified onto ground-truth demographic counts. These generally are obtained from either the decennial census or one of the waves of the American Community Survey. Hence, MRP provides a statistically principled way to both adjust for non-response bias and also obtain small-area estimates. We wish to emphasize that this is in contrast to more conventional survey weighting (e.g., using inverse probability or raking weights) which are often unable to estimate stable weights for sparse population strata.

While MRP has often been applied in nation-wide surveys for county or sub-county estimates, it can be applied at any geographic level where sufficient auxiliary information is present. A forthcoming paper by Circo, Melde, and McGarrell (2023) used MRP to estimate block-group level estimates of attitudes toward the police in Detroit, MI. For the current inquiry, as long as survey respondents can be geographically identified to the micro-level, the aforementioned MRP approach can be used. For example: if survey respondents identified the street intersection nearest their home, demographic information on sex and race could easily be obtained at the block or block group level. A preliminary proof-of-concept study using a community survey of 842 residents in Raleigh, NC showed that obtaining stable model estimates in all 107 block groups was trivial. Given the cost estimates above ($10,000/1,000 responses) a mid-to-large sized city could easily obtain small-area estimates of survey responses. This has the added benefit of helping to generate survey estimates for regions of a city which are typically underserved, and consequently often have lower response rates than more affluent areas.

When considering MRP for this approach, it is important to consider specifically *why* this method is effective for DOJ’s stated goals. First, MRP effectively utilizes existing population demographic data to adjust for differential non-response. Second, given the importance assigned to survey estimates at small levels of geography, MRP can effectively generate estimates for these small areas within sparsely populated demographic strata (for example, the 18–24-year-old Black Males). Historically it is these specific groups (young minority males) which are disproportionately underrepresented in surveys. (ADD SOME MORE STUFF HERE ABOUT GEOGRAPHIC ANALYSIS, SPATIAL WEIGHTS, ETC…)