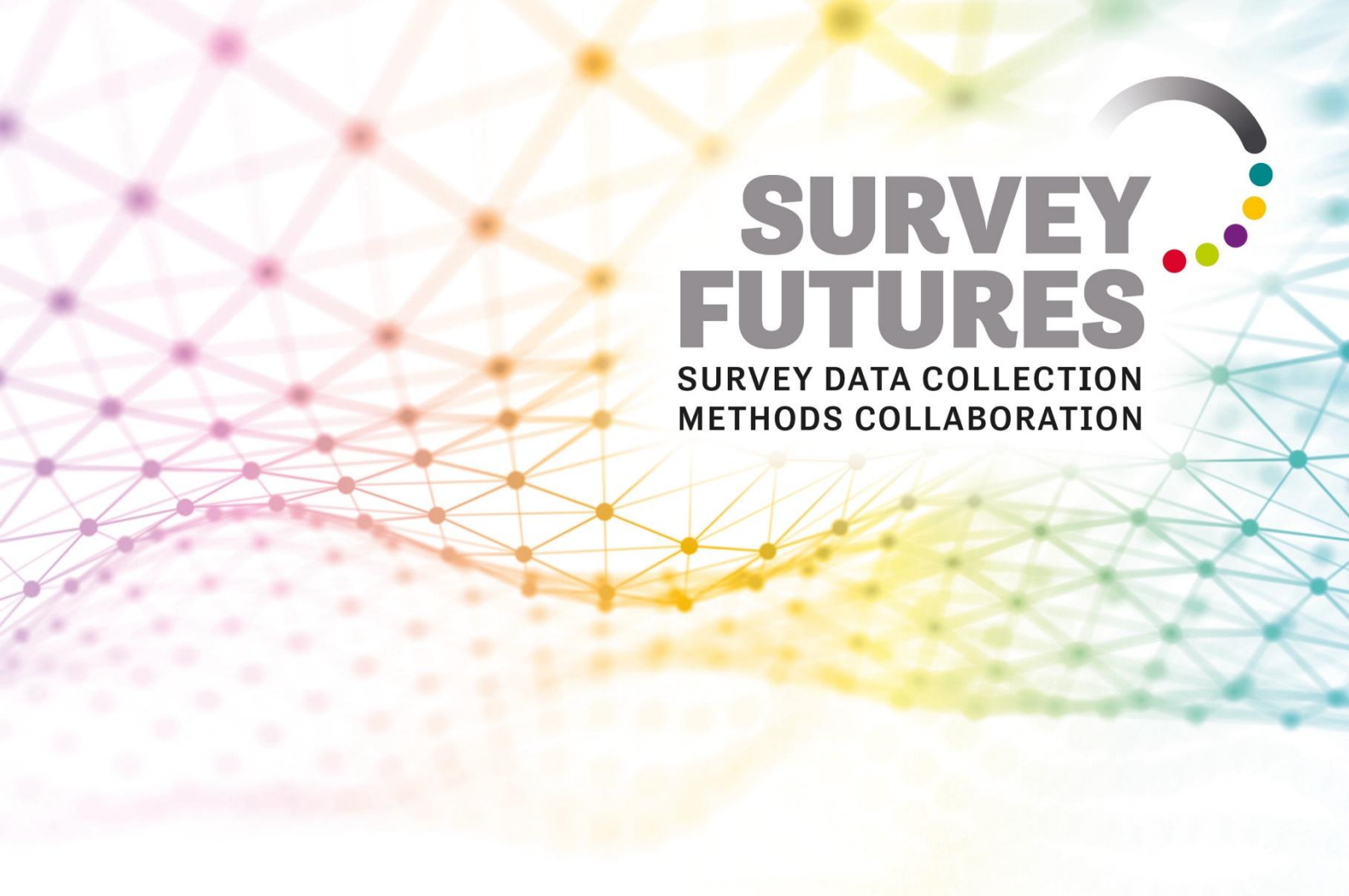




SURVEY FUTURES

**SURVEY DATA COLLECTION
METHODS COLLABORATION**

Report 16: Using the ONS Reference Data Management Framework: A Cost-Quality Comparison

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www.surveyfutures.net

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Survey Futures is an Economic and Social Research Council (ESRC)-funded initiative (grant ES/X014150/1) aimed at bringing about a step change in survey research to ensure that high-quality social survey research can continue in the UK. The initiative brings together social survey researchers, methodologists, commissioners, and other stakeholders from across academia, government, private and not-for-profit sectors. Activities include an extensive programme of research, a training and capacity-building (TCB) stream, and dissemination and promotion of good practice. The research programme aims to assess the quality implications of the most important design choices relevant to future UK surveys, with a focus on inclusivity and representativeness, while the TCB stream aims to provide understanding of capacity and skills needs in the survey sector (both interviewers and research professionals), to identify promising ways to improve both, and to take steps towards making those improvements. Survey Futures is directed by Professor Peter Lynn, University of Essex, and is a collaboration of twelve organisations, benefiting from additional support from the Office for National Statistics and the ESRC National Centre for Research Methods. Further information can be found at www.surveyfutures.net.

Research Strand 1 of Survey Futures (“Enhanced sampling frames and procedures”) focuses on the challenges associated with our dependency on using the Postcode Address File (PAF) as a sampling frame for random probability surveys. One of the projects within this strand explores the feasibility of using the Reference Data Management Framework produced by the Office for National Statistics to improve survey sampling processes, as well as other design features and survey implementation.

We would like to express our sincere gratitude to the Office for National Statistics (ONS) for their invaluable support and collaboration in the preparation of this report. Their collective expertise, insights and assistance have significantly enhanced the quality and comprehensiveness of this work. We are deeply appreciative of their contribution.

1. Introduction

High-quality social survey data is fundamental to understanding attitudes and behaviours, monitoring change, and informing effective public policy. In the United Kingdom (UK), however, traditional survey approaches face increasing challenges. Response rates to face-to-face surveys have declined, operational costs have risen, and achieving representative samples has become more difficult.

These pressures have intensified the need for new, more efficient, and more robust approaches to sampling and data collection. While recent developments in the field, such as the growth of mixed-mode and multi-mode designs, and the use of targeted and responsive designs, offer promising solutions to these challenges, the absence of a population register prevents the UK from fully capitalising on these new advancements.

Against this backdrop, recent developments in administrative data infrastructure – most notably the Office for National Statistics' Reference Data Management Framework (RDMF) – offer a potential step change in the way UK social surveys are designed and delivered (Office for National Statistics, 2026). While originally conceived to support data linkage and the production of population and migration statistics, the RDMF may offer opportunities to improve survey quality at each stage of the survey lifecycle.

Within the Survey Futures programme, earlier work has explored how the RDMF could theoretically reduce key sources of error, enhance measurement, and support more inclusive and efficient survey designs (*Perera et al, 2026*). This report builds on that foundation by undertaking a focused case study: reassessing the design of the Wales National Travel Survey (WNTS) under the assumption that the RDMF – rather than the PAF – could be used as the sample frame. The WNTS provides an ideal test case because it has been designed as a new high-quality survey from first principles in the post-COVID-19 landscape, and all design decisions and trade-offs are fully documented and publicly available (Transport for Wales, 2023).

The WNTS was designed by the National Centre for Social Research (NatCen) in collaboration with Transport for Wales and the Welsh Government. It was designed using NatCen's REMoDEL approach (National Centre for Social Research, 2022), a systematic framework for designing and redesigning social surveys. More detail on the approach can be found here: <https://tfw.wales/projects/wales-national-travel-survey/research-and-development>

The original WNTS evaluation, completed in 2023, assessed five survey mode designs using PAF as the sampling frame. The design choices – and their associated quality trade offs – were shaped by the inherent limitations of address-based sampling: the need for within household respondent selection, the exclusion of some population groups, limited personalisation of contact materials, and reliance on mixed mode data collection to mitigate coverage concerns. These constraints influenced both quality and cost, especially for designs that depended

heavily on interviewer fieldwork. This report revisits those design decisions in light of what would be possible if the RDMF were used instead. Specifically, we examine:

- **How key design decisions might change** when administrative data are available to inform sampling, targeting, follow-up and weighting, particularly address-level data and, if permitted, individual-level data.
- **How each of the WNTS Evaluate-stage quality dimensions** (accuracy, credibility, comparability, coherence, completeness, relevance, timeliness, cost-effectiveness, and usability) would likely shift under an RDMF-based design, and what overall design would likely be commissioned.
- **The relative cost implications** of the original PAF-based design versus a plausible RDMF-enabled design.

By assessing the likely quality and cost implications of using the RDMF in practice, this report aims to provide an evidence-informed basis for considering how administrative data could be incorporated into future large-scale social surveys, and what that would mean to both the design and cost of high-quality social surveys in the UK.

This report is intentionally framed as a forward-looking, exploratory assessment of how survey design *could* change under a scenario in which the Reference Data Management Framework (RDMF) is available for use in ways that are not currently operationally, legally, or technically feasible. In particular, the analysis considers a counterfactual ‘future-state’ in which the RDMF could support individual-level sampling and direct survey implementation outside of its current use within ONS.

This scenario should not be interpreted as reflecting the current capabilities or accessibility of the RDMF. Rather, it is used as a device to isolate and understand the potential impact of removing key constraints associated with address-based sampling frames. The intention is to explore what *could be possible* under a more mature administrative data infrastructure, and to provide insight into the direction and magnitude of potential changes in cost and quality.

2. Aims and Objectives

The purpose of this report is to assess how the use of the ONS Reference Data Management Framework (RDMF) could reshape the design and cost profile of a large-scale social survey, using the Wales National Travel Survey (WNTS) as a worked case study. Building on the earlier conceptual assessment of RDMF benefits, this report moves from theory to application by evaluating how RDMF availability could alter both the methodological choices and the expected performance of a real survey design.

This exploration is part of the larger Survey Futures project, titled "Could the ONS Reference Data Management Framework transform how social surveys are conducted in the UK?" The project addresses two primary research questions:

1. How could the RDMF be used to improve the end-to-end survey data collection process and/or reduce costs?
2. What are the constraints and possible solutions for using the RDMF in the design and implementation of social surveys?

In contributing to the first research question, this report focuses on a detailed assessment of the potential survey design options and cost reductions achievable through the use of the RDMF. It is important to note that while this report moves beyond purely theoretical exploration to present illustrative applications, it does not consider potential barriers such as access restrictions to the RDMF, data quality issues, technological challenges, or legal and ethical challenges.

It is important to emphasise that the applications described in this report are not currently feasible in practice. At present, the RDMF is accessible only within strictly controlled environments and does not support its use as a survey sampling frame in the way described here, particularly outside ONS. No single user has access to the full, identifiable dataset, and its primary purpose is to support de-identified data linkage for statistical production rather than survey operations.

As such, the analysis presented should be understood as illustrative and exploratory rather than operational. Consideration of legal, ethical, governance, and access constraints is outside the scope of this report but is addressed in parallel work within the Survey Futures programme.

The specific objectives covered in this report are as follows:

1. **Assess how core survey design decisions would change when using the RDMF**
 - Examine how the availability of administrative records would influence sampling strategy, stratification, mode choice, contact methods, within household selection, and weighting procedures.
 - Identify which design constraints present in the original PAF-based WNTS evaluation would be relaxed or removed under an RDMF-based approach.

- Set out the likely characteristics of a future WNTS design developed from an RDMF starting point.
- 2. Re-evaluate the WNTS quality dimensions under RDMF assumptions**
- Re-assess the nine quality dimensions used in the WNTS Evaluate stage – accuracy, credibility, comparability, coherence, completeness, relevance, timeliness, cost effectiveness, and usability – based on the capabilities introduced by the RDMF.
 - For each dimension, discuss the expected direction and magnitude of change compared with the PAF-based scores, highlighting areas of substantial improvement, areas that remain largely unchanged, and any dimensions where new risks may arise.
 - Suggest an outline design for the survey based on using RDMF as the sample frame.
- 3. Compare the relative costs of PAF based and RDMF based designs**
- Provide a relative comparison of the cost implications of the original WNTS PAF design and a hypothetical RDMF-enabled design, using indexed or proportional cost indicators.
 - Present alternative cost scenarios to reflect uncertainty in assumptions around design and implementation.
 - Develop cost scenarios based on a range of plausible RDMF-based response rates, recognising that expected response levels under an RDMF-sampled design are not yet known.

3. The Reference Data Management Framework

The Reference Data Management Framework (RDMF) is a major development in the Office for National Statistics' (ONS) move towards an integrated administrative data system capable of supporting a wide range of statistical and analytical uses (Office for National Statistics, 2026). Designed initially to underpin population and migration statistics through secure linkage of administrative sources, the RDMF also has significant potential value for survey research. Its structure, coverage, and update cycle offer opportunities to enhance sampling frames, streamline data collection, and improve the accuracy and coherence of survey outputs (Perera et al, 2026).

At its core, the RDMF provides a unified, centrally managed infrastructure for linking de-identified administrative data from across government departments, ensuring that reference data for people, businesses and locations are standardised, consistent, and updated at regular intervals. This reduces duplication, improves coherence between statistical outputs and – crucially for survey design – could be used for individual-level sampling in England and Wales.

The RDMF is built around four interlinked indexes: Demographic, Business, Location, Classification:

The Demographic Index (DI)

A longitudinal, person-level dataset that brings together records from multiple administrative sources, including: birth and death registrations; tax and benefits systems (e.g., PAYE RTI); health service records (e.g., Personal Demographic Service); and education records across England and Wales, with limited coverage for Scotland and Northern Ireland due to the absence of equivalent health and education data. Scotland and Northern Ireland have their own RDMF equivalents.

The DI provides a unique reference identifier for each person, replacing direct identifiers such as names and National Insurance numbers to support privacy-preserving linkage. It includes demographic attributes, address histories, and markers of interaction with public services. As a result, it offers near-complete population coverage, updated at least every six months.

The Business Index (BI)

A comprehensive linked register of UK businesses and organisations at legal unit level, drawing on HMRC VAT and PAYE records; Companies House registers; Financial Conduct Authority data; and additional statutory sources.

This index is less relevant to household and social survey sampling but contributes to the broader coherence of ONS statistical systems.

The Location Index (LI)

A composite index made up of the Address Index (AI) and the Geography Index (GI). The Address Index (AI) contains all the addresses in the UK (with unique property reference numbers). It includes data from the AddressBase Premium and Islands, the Postcode Address File, the National Address Gazetteer, and the quarterly NRS Address Data dataset from National Records of Scotland. The Geography Index (GI) contains a range of statistical and administrative geographies created by the ONS Geography team, such as Output Areas, Local Authority Districts, Ward Boundaries, Parliamentary Constituencies, Regions, Health Geographies, and Postcode Boundaries.

Although surveys have historically relied on the PAF alone, the LI includes broader classifications, occupancy indicators, and more complete coverage of non-traditional or communal living settings.

The Classification Index (CI)

A supporting index containing standardised classifications for industry and occupation (e.g., Standard Industrial Classifications (SIC), Standard Occupational Classifications (SOC)). While not directly a sampling asset, these classifications facilitate social stratification, data editing and coding.

Key Characteristics Relevant to Survey Design

The RDMF offers several features that are directly relevant to survey design and that represent substantial improvements over PAF-based sampling.

- **Population Coverage.** Because the RDMF draws on multiple large administrative datasets, it provides far more complete population coverage than the PAF. Individuals who are typically underrepresented in household-based sampling – such as those in communal establishments, people without stable housing, and individuals who move frequently – are more likely to appear in the Demographic Index through their interactions with public services.
- **Individual-Level Linkage.** Unlike PAF, which is only a list of addresses, the RDMF enables linkage to individual-level data that could in theory be used to support sampling, either by directly sampling individuals from the Demographic Index or via the Location Index. If access to individual-level data was permitted, this would remove the need for within-household respondent selection, allow targeting based on known demographic characteristics, and ensure more equal selection probabilities across households of different sizes – an important foundation for the design changes explored later in the report.
- **Data Richness.** The RDMF includes core demographic attributes and can be linked to additional administrative records such as education, income proxies, and health indicators. This could potentially provide: more variables for stratification and targeted boosts, richer auxiliary data for weighting and imputation, and scope to shorten

questionnaires by replacing standard demographic questions with administrative information.

- **Timeliness.** The RDMF is updated frequently (daily for the Business Index, every six weeks for the Location Index, and every six months (with plans for more frequent updates) for the Demographic Index) meaning sampling frames reflect population changes more quickly than PAF-based systems.

It is important to note that the RDMF does not currently include contact details such as telephone numbers or email addresses. In the scenario considered in this report, contact is assumed to be primarily via postal addresses derived from linkage to the Location Index. This has implications for how individuals, particularly those with unstable or irregular housing, could be contacted in practice.

Limitations and Open Questions

Despite its clear advantages, several issues must be addressed before the RDMF can be used operationally as a survey sampling frame:

- Legal and ethical frameworks governing its use in surveys are still developing.
- Security, privacy and public acceptability concerns will need to be considered and addressed. The RDMF is designed as a de-identified data infrastructure, with confidentiality and privacy protection central to its purpose and public acceptability. Using it to support survey sampling at the individual level would represent a significant shift in both its use and risk profile, particularly if re-identification were required to contact selected individuals. Further work would be needed to understand how such an approach could be implemented in a way that maintains public trust, satisfies legal and ethical requirements, and appropriately manages disclosure and privacy risks.
- Access arrangements for external survey organisations require clarification.
- Further work is needed to understand data quality across different population subgroups and across different characteristics and variables drawn from administrative data.
- Expected response rates for an RDMF-based design are unknown.

These represent fundamental constraints on the current use of the RDMF and would need to be addressed before any operational application as a survey sampling frame could be considered. Nevertheless, the RDMF represents a significant opportunity to rethink UK survey methodology, and applied to the WNTS, offers a compelling basis for revisiting the design choices previously made under the constraints of the PAF.

Further information about the RDMF can be found on the ONS website at <https://www.ons.gov.uk/aboutus/whatwedo/programmesandprojects/referencedatamanagementframework>.

4. Methods

This chapter describes the methodological approach used to assess how the availability of the ONS Reference Data Management Framework (RDMF) would alter the design decisions, quality and cost profile of the Wales National Travel Survey (WNTS). The approach integrates established survey quality frameworks with NatCen's structured REMoDEL methodology for transforming social surveys.

4.1 Study Approach

Total Survey Error (TSE) and Total Survey Quality (TSQ) Frameworks

The assessment is grounded in the Total Survey Error (TSE) framework, which categorises all potential sources of error that may arise during survey design, data collection, and processing. Alongside this, the Total Survey Quality (TSQ) framework is used to evaluate broader quality dimensions such as credibility, comparability, timeliness, cost-effectiveness, and usability (Biemer P. P., 2010). These frameworks provide a structured basis for examining how the shift from a PAF-based sampling frame to an RDMF-based one would affect both the survey design and quality of a survey such as the WNTS.

NatCen's REMoDEL Approach

The methodology also draws on NatCen's REMoDEL approach (National Centre for Social Research, 2022): a six stage, systematic process for survey transformation (Review → Evaluate → Model → Design → Experiment → Launch). This report focuses in particular on the Evaluate stage: assessing the feasibility and trade-offs of alternative survey designs on the assumption of the use of an RDMF-based sampling frame, identifying implications for sampling, mode, contact strategy, weighting, and expected quality.

The REMoDEL approach emphasises evidence-based evaluation of trade-offs, drawing on methodological literature and NatCen's extensive survey transformation experience. Its use ensures a systematic and transparent comparison between PAF- and RDMF-based designs.

Qualitative Assessment and Scenario Analysis

Given that the RDMF has not yet been used operationally for household or individual survey sampling, this analysis adopts a mixed-methods approach:

- Qualitative assessment of the potential impact of using RDMF on each key design decision, and against each TSQ dimension, using expert judgement and REMoDEL-derived evaluative criteria.
- Scenario modelling, particularly for costs and response rates, to address uncertainties surrounding the operational deployment of the RDMF.
- Comparative end-to-end design analysis to identify where RDMF-driven changes are most significant.

This combination of methods enables an informed and pragmatic assessment of potential survey designs under different sampling frame assumptions.

The analysis therefore adopts a counterfactual perspective, comparing the observed PAF-based design with a hypothetical RDMF-enabled design under a consistent set of assumptions.

This approach allows the effects of the sampling frame to be isolated, while holding other aspects of the design constant as far as possible.

4.2 Case Study: Wales National Travel Survey (WNTS)

NatCen has acted as the Delivery Partner for Transport for Wales and Welsh Government to design and deliver a new Wales National Travel Survey since 2023. To do this, we adopted the REMoDEL approach. During the Review and Evaluate stages (Transport for Wales, 2023), the WNTS design team applied the REMoDEL approach to identify viable mode and sampling strategies using the PAF. After an expert review of requirements and constraints, five survey designs were shortlisted for detailed evaluation, covering single mode and sequential mixed mode options. These designs were assessed across the nine dimensions of Total Survey Quality.

The Five Shortlisted Designs

1. Face to face only (CAPI)
2. Web only (CAWI)
3. Web → Face to face (CAWI → CAPI)
4. Web → Telephone → Face to face (CAWI → CATI → CAPI)
5. Telephone → Face to face (CATI → CAPI)

Each design was evaluated for accuracy, credibility, comparability, coherence, completeness, relevance, timeliness, cost-effectiveness, and usability.

Purpose of Re-evaluating These Designs Under RDMF Assumptions

The goal of this report is not to propose an entirely new WNTS design, but to reassess the same five designs – and the design decisions underpinning them – under the assumption that the RDMF is available as an individual-level sampling frame. This re-evaluation aims to:

- Understand how design constraints inherent in PAF-based sampling would change under RDMF.
- Identify which designs would likely perform better or worse once RDMF capabilities (direct individual sampling, richer stratification, personalisation, reduced design effects) are taken into account.
- Examine how expected performance shifts across the TSQ dimensions.
- Inform the relative cost implications of shifting from PAF to RDMF.

Using the WNTS as a case study ensures that the assessment is grounded in a real, contemporary survey design and provides a practical demonstration of the potential impact of the RDMF on survey methodology in the UK.

It is important to note that this case study focuses on a single country. Extending this approach to UK-wide surveys would introduce additional complexity due to differences in data availability, linkage infrastructure, and governance arrangements across England, Wales, Scotland and Northern Ireland.

While this assessment focuses on a scenario in which the RDMF is used as the primary sampling frame, it is important to recognise that a more likely medium-term pathway would

involve hybrid approaches. For example, an address-based sampling frame (such as PAF or AddressBase) could be augmented through linkage to administrative data, including elements of the RDMF, to enhance stratification, targeting, and weighting.

Such hybrid designs may offer a more practical and incremental route to realising some of the benefits described in this report. However, they are not the primary focus of this analysis, which instead seeks to understand the full potential impact of removing the constraints associated with address-based sampling altogether.

5. How key design decisions would change when using RDMF

The move from an address-based sampling frame (the Postcode Address File, PAF) to the Reference Data Management Framework (RDMF) fundamentally alters the constraints, opportunities, and trade-offs involved in designing a high-quality social survey such as the Wales National Travel Survey (WNTS). Whereas the original WNTS design process was shaped by the inherent limitations of the PAF – primarily that it is a list of addresses, or delivery points – the RDMF potentially offers a substantially richer and more inclusive set of inputs for sampling, stratification, contact, and fieldwork planning.

This chapter examines how each of the principal design decisions taken during the WNTS Review and Evaluate stages would shift under an RDMF-based approach. The discussion follows the end-to-end survey lifecycle, with clear comparisons between the design logic under PAF and the likely updated logic under RDMF.

5.1 Sampling strategy and target population

Under the PAF, the WNTS sampling strategy was necessarily built around residential addresses rather than individuals, which shaped both the achievable target population and the operational steps required to draw a probability sample. Because the sampling frame contained only addresses – with no information on who lived at them, how many residents were present, or whether the address was occupied – the target population had to be defined pragmatically as adults living in private residential households. This approach unavoidably excluded people in communal establishments, individuals without stable housing, and others who were less likely to be captured by the PAF.

Once an address was selected, fieldwork required an additional stage to identify eligible household members and select an individual respondent at random. This within household selection step, while standard practice in address-based surveys, introduced opportunities for error and non-compliance – particularly in self-administered or push to web designs where the selection procedure must be followed without interviewer guidance. The reliance on addresses also meant that coverage error related to mobility, occupancy, and transient populations was difficult to avoid and impossible to correct at the sampling stage. As a result, the PAF-based sampling strategy carried several representation risks that were central to the trade-offs assessed in the REMoDEL Evaluate stage.

Revised position under RDMF

The RDMF has the potential to change the sampling landscape by enabling the sampling of individuals, either directly from the Demographic Index or by linking individual-level data from the RDMF to a sample of addresses drawn from its Location Index. This shift would substantially reduce the representation risks identified under the PAF. Because the RDMF consolidates multiple administrative sources, it includes individuals who may not appear at a postal address – such as those in communal accommodation, people with irregular housing arrangements, and individuals who interact with public services despite unstable residence histories. This supports a more inclusive definition of the target population, although more work would need to be done to understand how information held in the RDMF could be used to contact these different groups.

Crucially, the ability to use the RDMF to sample individuals would remove the need for within household selection to take place during fieldwork. This eliminates a known source of coverage and selection error and reduces respondent burden. Individual-level identifiers or characteristics also allow sampling probabilities to be applied evenly across households of different sizes, improving statistical efficiency and reducing the design effect.

Overall implication: Using the RDMF, person-level sampling could become the optimal approach. It offers stronger coverage, reduces several error pathways that were inherent under PAF, and provides a firmer foundation for the mode, contact and weighting decisions that follow in subsequent stages. In addition, equal-probability sampling at the individual level would remove variation in selection probabilities inherent in household-based designs, improving statistical efficiency.

5.2 Stratification and oversampling

Under the PAF sampling frame, the WNTS design team was limited to stratifying the sample using area-level characteristics such as region, urban-rural classification, and the Index of Multiple Deprivation. This reflected the fact that the PAF contains no information about the individuals living at each address: their demographic profile, socio-economic position, health status, family structure, or any other characteristics relevant to survey representation. As a result, the achievable stratification was necessarily coarse, and any attempt to tailor the sample more precisely to analytical needs – such as ensuring sufficient numbers of younger adults, disabled people, Welsh-speaking households, or particular occupational groups – required oversampling large geographic clusters rather than the population groups directly.

These constraints also meant that targeted oversampling of small or policy-critical groups was largely infeasible. Without individual-level information at the sampling stage, such oversampling would require substantial increases to the issued sample to achieve marginal gains in sub-group representation. This inevitably reduced cost-efficiency, increased design effects, and placed pressure on fieldwork resources. In the Evaluate stage, these limitations were central to the trade-offs between accuracy, comparability and cost-effectiveness across the five shortlisted designs.

Revised position under RDMF

Under an RDMF-based sampling frame, the range of stratification and oversampling options would expand significantly. Because the RDMF facilitates access to individual-level demographic attributes, and can be linked to further administrative indicators, it could enable a level of sample control that is not possible with address-only information. Variables such as age, sex, disability status, education indicators, income proxies, household composition markers and language use could be used to shape the sample at the point of selection rather than inferred afterwards. This would enable the sample to be stratified directly on characteristics of analytical importance, rather than relying on area characteristics as imperfect proxies.

In addition, access to individual-level data via the RDMF would make it feasible to oversample small or under-represented groups directly, such as young adults, minority ethnic groups, or disabled individuals. Instead of inflating the overall sample size or relying on expensive interviewer follow-up, the sampling frame itself would provide the information needed to

efficiently target these groups. Because the selection process would operate at the individual level, the resulting design effects are likely to be lower, and the gains in precision for sub-group estimates are substantially larger.

Within the REMoDEL Model stage, this represents a clear optimisation advantage. Stratification and oversampling become tools for improving accuracy, comparability and relevance without proportionally increasing cost. It also strengthens the link between design parameters and analytical outputs, a core principle of the Review and Evaluate stages.

Overall implication: Under the RDMF with access to individual-level data, the WNTS could adopt a more efficient, analytically-driven sampling strategy that supports richer disaggregation, reduces variance, and significantly enhances representativeness without the drawbacks associated with area-level stratification or large issued samples.

5.3 Mode decisions

Under the PAF, decisions about survey mode were fundamentally shaped by the limitations of the sampling frame. Because the PAF provides no information about the individuals living at an address, and because web-only surveys risk lower response rates among groups less able or willing to participate digitally, mixed-mode approaches were judged necessary to mitigate coverage and non-response biases, and ensure accessibility. In particular, the Evaluate stage identified that web-only designs – while cost-effective – were vulnerable to systematic gaps in representativeness and would require other modes to compensate. Face-to-face interviewing, although expensive, offered coverage of offline households and provided a mechanism for correcting imbalances introduced earlier in the sample. Telephone interviewing played a similar, though more limited, role.

As a result, the strongest-performing designs under PAF assumptions were those that sequenced modes – typically web-first, followed by telephone or face-to-face for non-responders. These designs were judged to strike the most favourable balance across the Total Survey Quality dimensions by offsetting the representational risks inherent in a web-first approach with the corrective power of interviewer-led modes.

Revised position under RDMF

Under the assumption that the RDMF can be used to produce a sample of individuals, the logic underpinning mode choice changes significantly. Because the RDMF could provide access to individual-level demographic information, the representational risks that previously necessitated heavy reliance on interviewer modes are likely to be reduced. Instead of using face-to-face or telephone interviewing as corrective tools, the Model stage can treat them as targeted and strategic options – to be deployed only where administrative data suggest they are likely to be most effective or where digital participation barriers can be anticipated.

This shift also enhances the viability of web-first, and even web-only, designs. With a more inclusive sampling frame, the risk that a web survey would systematically under-represent specific subgroups is diminished, particularly when the contact strategy can be personalised and tailored. The availability of detailed demographic information also enables more sophisticated mode allocation strategies, such as offering interviewer follow-up selectively to individuals predicted to have low digital propensity or lower initial cooperation.

Within the REMoDEL framework, this represents a clear rebalancing of the trade-offs assessed in the Evaluate stage. Under the PAF, mixed-mode designs were required to offset structural weaknesses in the frame; under the RDMF, mixed-mode designs become a matter of efficiency and optimisation, rather than necessity. As such, the Model stage would likely prioritise a web-first approach, supplemented by targeted interviewer modes where needed, while treating fully mixed-mode designs with multiple sequential follow-ups as potentially disproportionate to the representational risks that remain.

Overall implication: With the RDMF in place, web-based approaches gain credibility and accuracy advantages they could not achieve under the PAF, and interviewer modes shift from central pillars of representativeness to strategic, limited-use tools deployed where they add the most value. This reorientation has cascading implications for cost, timeliness, and respondent experience across the survey lifecycle.

5.4 Contact and fieldwork design

Under the PAF sampling frame, the contact strategy for the WNTS was constrained by the absence of individual-level information. All communications – advance letters, reminders, and instructions – had to be addressed generically to ‘The Resident’ because the PAF contains only postal addresses, not the names of the people who live there. This limitation reduced the scope for personalisation, which is known to influence engagement and response, particularly in self-administered survey modes. It also meant that every household received standardised materials regardless of their characteristics, circumstances, or likely response propensity.

These constraints created several challenges. First, generic communications tend to achieve lower opening and reading rates, especially for younger adults or population groups less engaged with mailed correspondence. Second, because the characteristics of household members were unknown at the sampling stage, there was no opportunity to tailor reminders, incentives, or mode options to specific subgroups. Third, the lack of individual identifiers made it difficult to manage non-response strategically; wide-scale interviewer follow-up was often necessary to counteract low web or mail engagement. Within the REMoDEL Evaluate stage, these limitations contributed to weaker performance for web-only designs and reinforced the value of interviewer-administered modes, which provide an alternative path to engagement when generic written communication is insufficient.

Revised position under RDMF

The introduction of the RDMF may enable a shift in contact strategy by, if permitted, communications to be addressed to named individuals. If such access is achievable, this could unlock several design improvements. Personalised invitations are more likely to be opened, read, and trusted, which can increase response rates without requiring additional reminders or interviewer involvement. Naming individuals also reduces uncertainty for recipients – they can see immediately that the invitation is intended specifically for them, rather than a generic leaflet for all occupants – thereby strengthening legitimacy and reducing perceived burden.

Furthermore, because the RDMF enables access to individual-level demographic information, the Model stage can incorporate strategic segmentation into the contact plan. Subgroups known from administrative data to have historically lower response propensities – such as

younger adults, people living in social housing, or individuals with limited digital engagement – can be allocated different contact strategies, including varied reminder schedules, tailored messaging, or selective deployment of incentives. Conversely, groups likely to respond promptly to digital invitations may require minimal follow-up, reducing fieldwork costs.

The availability of individual-level demographic indicators also supports targeted mode allocation. For instance, older adults or those with characteristics indicating potential digital exclusion could be offered telephone or face-to-face options earlier in the sequence, whereas others might receive a streamlined digital-only pathway.

Overall implication: The RDMF could enable a more flexible, data-informed, and efficient contact strategy. Where PAF-based constraints forced a largely one-size-fits-all approach relying heavily on interviewer follow-up, the RDMF could support a personalised and segmented strategy that enhances response, reduces non-response bias, and minimises unnecessary fieldwork. Within the REMoDEL framework, this shift represents a clear rebalancing of the design trade-offs and strengthens the case for web-first or digital-first designs without undermining representativeness.

5.5 Weighting, calibration and imputation

Under the PAF-based design, the WNTS weighting strategy had to rely on the limited auxiliary information available from external population benchmarks – primarily the census, mid-year population estimates, and large-scale household surveys such as the Labour Force Survey. Because these sources provide only area-level or broad demographic distributions, weighting adjustments for coverage and non-response had to be made using indirect proxies rather than detailed individual-level characteristics. This necessarily restricted the sophistication of weighting models and constrained the potential to correct for differential non-response across important subgroups.

The absence of individual-level auxiliary variables also made it more difficult to identify and adjust for biases associated with within-household selection and household composition. Furthermore, imputation models for partially missing data were limited by the information available in the survey itself, which could lead to increased uncertainty where key predictors were not captured or were measured imprecisely. In the Evaluate stage, these limitations contributed to concerns about accuracy, particularly for designs more dependent on self-completion modes or those likely to experience higher non-response.

Revised position under RDMF

The RDMF introduces a fundamentally different set of opportunities for weighting, calibration and imputation. Because it enables access to rich individual-level demographic and socio-economic information – including age, sex, education, income proxies, address histories, and indicators of public service interaction – it could provide a much more extensive set of auxiliary variables against which the achieved sample can be calibrated. This allows weighting models to adjust more precisely for differential response patterns across population subgroups, reducing both bias and the variance inflation associated with strong weighting adjustments.

Within the REMoDEL Model stage, the RDMF supports weighting strategies that are better aligned with the survey's design parameters and analytical needs. Person-level population totals derived from administrative data can serve as accurate calibration targets, addressing many of the representation risks identified in the Evaluate stage. For surveys prone to mode-specific response patterns or demographic skews, having access to granular auxiliary information makes it far easier to stabilise estimates and maintain comparability across subgroups.

The benefits extend to imputation. A richer set of auxiliary variables enables more informative prediction models for item non-response and reduces reliance on internal survey variables alone. This is particularly advantageous for variables known to be prone to missingness or measurement error, such as income, employment status, or household composition. Administrative data can also serve as a consistency check, allowing implausible or inconsistent responses to be identified during data processing.

Overall implication: Under an RDMF-enabled design, the WNTS could implement more robust weighting and imputation procedures than were possible under the PAF. This improves accuracy, reduces variance, strengthens the credibility of subgroup estimates, and mitigates many of the representation and measurement risks highlighted in the Evaluate stage. In REMoDEL terms, the RDMF enhances the Model stage's capacity to optimise accuracy without increasing respondent burden or fieldwork cost.

5.6 Selection of household vs individual-level design

Under the PAF-based sampling strategy, the choice between a household-level or individual-level survey design involved a set of practical and methodological trade-offs. Because the sampling frame consisted only of addresses, identifying eligible respondents within each selected household required an additional within-household selection step for individual-level designs. In interviewer-led modes, this step could be managed reliably, but in self-administered or web-first designs, compliance depended on respondents correctly following instructions without oversight. This introduced a risk of selection bias, especially among larger or more complex households.

These challenges made household level designs comparatively attractive within the Evaluate stage. Once an interviewer gained access to a household, collecting information from all eligible members could be operationally efficient and reduce the need for random selection. Household-level data also offered richer insights into shared behaviours, such as vehicle availability or intra-household travel patterns – an aspect relevant to the WNTS. However, household-level approaches also brought drawbacks: higher respondent burden, the need to relax certain proxy rules, and more complex weighting and analysis due to clustering. Under PAF constraints, ultimately the WNTS went with an individual-level approach, but allowed up to two completes per household.

Revised position under RDMF

With the introduction of the RDMF, the balance of advantages and disadvantages between household- and individual-level and multi-adult designs changes substantially. If the RDMF can be used to produce a sample of individuals, the need for any within-household selection procedure during fieldwork disappears. Each sampled person can be contacted and invited in

their own right, regardless of household size or composition. This eliminates the selection errors and respondent missteps that previously accompanied self-administered individual designs under the PAF.

From a statistical standpoint, individual-level sampling under the RDMF also reduces clustering and the associated design effects. By selecting individuals independently, the survey can achieve greater precision for the same number of completed interviews, strengthening the alignment between design parameters, sample efficiency, and analytical needs – a core objective within the REMoDEL Model stage.

A potential limitation of a fully individual-level design is the reduced ability to capture intra-household travel behaviours and interactions, which are important for understanding shared travel decisions and resource use within households. Where such insights are required, additional design features (e.g. multi-person sampling within households) may still be necessary.

Overall implication: Under an RDMF-based approach individual-level sampling offers clear advantages in accuracy, efficiency, and respondent experience. As such, the Model stage would likely prioritise an individual-level design as the preferred option in an RDMF-enabled WNTS.

5.7 Summary: PAF vs RDMF design choices

The table below outlines how major design choices on the WNTS may vary between PAF-based and RDMF-based sampling options:

Design Element	Sample frame	
	PAF	RDMF
Sampling strategy	Address → household → individual	Direct individual sampling
Stratification and oversampling	Area-level only	Individual-level, richer variables
Mode choice	Mixed-mode essential	Web-first / web-only more viable
Contact and fieldwork design	Limited scope for targeting	High scope for personalised, targeted contact
Weighting	Area-level, limited	Individual-level, richer covariates

6. Quality dimension reassessment

This chapter re-evaluates the five shortlisted WNTS survey designs under the assumption that the Reference Data Management Framework (RDMF) – rather than the Postcode Address File (PAF) – is used as the sampling frame and that access to individual-level data is available.

While the analysis highlights a number of potential improvements in survey quality under an RDMF-based design, it is important to recognise that new risks and challenges would also arise. These include the possibility that sampled individuals may no longer reside at recorded addresses, the need for additional processes to verify respondent identity, and the potential for unintended disclosure or perceived intrusion when using administrative data for survey contact. These factors introduce new sources of error and operational complexity which are not present, or are less pronounced, under address-based sampling. More research would be needed to understand these new risks.

The structure mirrors the nine quality dimensions used in the WNTS Evaluate stage. For each dimension, we summarise:

1. the issues identified under the PAF-based design,
2. the likely effect of using the RDMF, and
3. the implications for how designs might score differently under RDMF assumptions.

This reassessment is qualitative. Its purpose is to understand the direction and scale of likely improvement (or any new risks), not to provide numerical scores. The five designs are:

1. Face-to-face only (CAPI)
2. Web-only (CAWI)
3. Web + Face-to-face (CAWI → CAPI)
4. Web + Telephone + Face-to-face (CAWI → CATI → CAPI)
5. Telephone + Face-to-face (CATI → CAPI)

6.1 Accuracy

Accuracy refers to the extent to which survey estimates minimise measurement and representation error. It encompasses all potential sources of bias and variance that may affect the validity of data, including coverage, sampling, non-response, measurement and processing errors, as articulated in the WNTS Evaluate stage.

WNTS Assessment Using PAF

Under the PAF-based sampling frame, accuracy was limited by the fact that the frame contains only addresses and no information about the residents living at those addresses. This required the use of within-household selection to identify an eligible adult, an approach that can be prone to respondent error and non-compliance, particularly in web-first or other self-administered modes. The PAF also excludes people who do not live in private residential households, such as those in communal establishments or with unstable housing, which contributed to representation error. Because stratification could only be based on area characteristics rather than individual attributes, sampling error could not be minimised effectively for key demographic subgroups. As a result, designs incorporating interviewer-led

modes tended to perform better in the WNTS evaluation because they were better able to correct for errors introduced earlier in the sampling process.

Key RDMF Effects

If the RDMF were available and access to individual-level data was permitted, the following factors would impact on the assessment of accuracy.

- Either direct individual-level sampling or, if this was not permitted, linking individual-level data to sampled addresses from the Location Index, would remove the need for within-household selection during fieldwork and eliminate the associated selection errors.
- More complete population coverage would reduce systematic undercoverage, particularly for groups not well represented in household-based frames.
- Individual-level demographic information would enable richer and more effective stratification, lowering sampling error.
- Enhanced weighting and calibration using administrative variables would improve adjustments for non-response and coverage bias.

Under the PAF-based WNTS design, individuals do not have equal probabilities of selection. The hybrid approach – allowing up to two adults to self-select in the push-to-web stage, combined with the selection of one adult in the face-to-face stage – introduces variation in selection probabilities across individuals. While the resulting design effect has not yet been empirically estimated for WNTS, it would be expected to lie somewhere between that of a one-person-per-household design (typically around 1.28) and a two-person design (around 1.11), depending on the relative contribution of each component.

Under an RDMF-based approach, where individuals could be sampled directly with equal probability, this source of inefficiency would be removed. This would be expected to improve statistical efficiency, although the precise magnitude of the improvement for WNTS is uncertain.

Expected Change

All things being equal, accuracy would be expected to improve under an RDMF-based design for all shortlisted designs. The removal of within-household selection error, improved coverage and more precise stratification would provide a stronger foundation for producing representative estimates. This would be expected to improve statistical efficiency, and mean that the same effective sample size may be achievable with fewer completed interviews, reducing survey costs, although the precise magnitude of the improvement for WNTS is uncertain.

It should also be noted, however, that under the RDMF, linkage quality becomes a new consideration and determinant of accuracy. This can introduce new biases. These would need to be explored before we can be confident of the accuracy of the RDMF.

If the RDMF itself is accurate, RDMF-based approach would support more valid and precise estimates across all design options. Designs that previously performed less well under the PAF, particularly web-first and web-only designs, would benefit significantly because many of the accuracy concerns associated with self-administered modes would no longer apply. Mixed-

mode and interviewer-led designs would still experience some improvement, but their relative advantage would be reduced because they would no longer be needed to compensate for weaknesses in the sampling frame.

However, more work is needed to establish and measure the accuracy of the RDMF. The accuracy of the data held in the core indexes, the accuracy of the matching process, and the accuracy of the linkage to the RDMF are all currently unknown.

6.2 Credibility

Credibility refers to the extent to which the data produced by a survey are sufficiently robust and reliable to support their intended uses. In the WNTS Evaluate stage, this includes the ability of a design to maximise participation, achieve Accredited Official Statistic status, and continue data collection effectively in unexpected events such as a pandemic.

WNTS Assessment Using PAF

Under the PAF-based designs, credibility differed substantially across the shortlisted modes. Web-only designs were considered less credible because of anticipated lower response rates and reliance on generic postal invitations, which weakened confidence in the robustness of the achieved sample. Mixed mode, web first designs performed better because they offered alternative routes for engagement, helping maintain sample representativeness.

Face-to-face designs were viewed as the most credible in terms of data robustness and their likelihood of meeting Official Accredited Statistics requirements. However, they scored poorly on continuity in unexpected events, as field interviewing could not be maintained during situations such as a pandemic or movement restrictions. Web-first and mixed-mode designs were assessed as better able to maintain operations during such events, given their reduced reliance on in-person contact.

Key RDMF Effects

If the RDMF were available and access to individual-level data was permitted, the following factors would impact on the assessment of credibility:

- If names were available, personalised invitations addressed to named individuals would likely improve participation and reduce non-response bias.
- More comprehensive and inclusive coverage would strengthen representativeness at the outset, reducing reliance on interviewer modes to maintain sample robustness.
- Richer auxiliary information would allow stronger non-response adjustment, improving the defensibility of estimates even if response rates vary.
- The ability to tailor contact and follow-up strategies by demographic characteristics would help secure cooperation from underrepresented groups.
- Reduced need for face-to-face interviewing would improve continuity of collection during unexpected events, supporting resilience in fieldwork operations.

Expected Change

Credibility would be expected to improve across all RDMF-based designs, with the greatest gains for web-first and web-only approaches. With personalised contact, improved

representativeness, and more targeted follow-up options, these modes could achieve levels of robustness that were previously unattainable under a PAF-based design.

Designs that rely heavily on face-to-face interviewing would lose some of their comparative advantage, as many of the issues they were intended to mitigate (coverage concerns, selection bias, low initial engagement) would be alleviated by the RDMF. Moreover, the reduced dependence on interviewer-based data collection would improve resilience during unexpected events, further enhancing credibility across a broader range of mode options.

It should be noted, however, that credibility relies on a robust sampling frame. More work is needed to assess the accuracy, and therefore credibility, of the information held within the RDMF.

6.3 Comparability

Comparability refers to the extent to which the survey design supports reliable comparisons across groups, time periods, and geographies. In the WNTS Evaluate stage, this included the ability to produce sufficiently large effective sample sizes for regional analysis, comparisons between remote and non-remote workers, and disaggregated estimates for protected characteristics, as well as the degree to which mode effects might undermine comparability.

WNTS Assessment Using PAF

Under the PAF-based evaluation, comparability varied considerably across the shortlisted designs. Web-only and web-first mixed-mode designs performed best because their scalability allowed large sample sizes to be achieved within budget, supporting the analytical need for disaggregated regional and demographic comparisons.

In contrast, designs dependent on interviewer-led modes, especially face-to-face and telephone combined with face-to-face, were limited by higher fieldwork costs, resulting in smaller achievable sample sizes and reduced ability to generate sufficiently precise subgroup estimates.

The Evaluate stage also identified that mixed-mode designs carried a risk of mode measurement effects, particularly those combining web, telephone, and face-to-face data collection. These risks could compromise comparability if respondents' answers varied systematically by mode, especially for attitudinal or sensitive questions. Overall, comparability under the PAF was shaped by a combination of cost constraints, mode effects, and the limited scope for targeted oversampling.

Key RDMF Effects

If the RDMF were available and access to individual-level data was permitted, the following factors would impact on the assessment of comparability:

- Individual-level demographic data would allow more informed stratification, improving the balance of the achieved sample across key analytical groups.
- The ability to oversample specific subgroups directly would support more robust estimates for small populations, improving comparability across regions and protected characteristics.

- Reduced reliance on interviewer-led modes would limit the risk of some kinds of mode effects that previously threatened comparability in mixed-mode designs.
- More complete population coverage would reduce systematic gaps in the sampling frame, leading to more consistent representation across geographical and demographic domains.
- Higher effective sample sizes, due to assumed lower design effects and more efficient sampling, would strengthen the precision of comparative estimates.

Expected Change

In the long-term, comparability would be expected to improve under an RDMF-based approach. Designs such as web-first and web-only, which were already strong performers under PAF due to their scalability, would gain further advantage from richer stratification and the ability to oversample analytically important groups. By reducing the need for multiple interviewer-led follow-up modes, the RDMF would also mitigate mode measurement effects, one of the key risks highlighted for some mixed-mode combinations in the original evaluation.

Interviewer-led designs would continue to support robust geographic comparisons under both PAF and RDMF approaches. However, their effectiveness would remain constrained by higher costs, which limit achievable sample sizes and therefore reduce the precision of subgroup estimates relative to more scalable web-based designs.

6.4 Coherence

Coherence refers to the extent to which data collected from different modes or sources can be reliably combined. In the WNTS Evaluate stage, this included assessing mode consistency with the digital travel diary, the likelihood of securing consent for follow-up studies, and the expected level of participation in the diary component based on the survey mode.

WNTS Assessment Using PAF

Under the PAF-based evaluation, coherence varied across the shortlisted designs depending on the degree of alignment between the survey mode and the web-based travel diary. Web-first designs scored relatively well because respondents were already engaged in an online environment, reducing the risk of attrition between the survey and diary stages. Fully interviewer-led designs, by contrast, were assessed as less coherent, as the transition from a face-to-face interview to a self-completion online diary introduced a change in mode that could increase dropout or affect reporting consistency.

The Evaluate stage also noted that mixed-mode designs incorporating web, telephone and face-to-face elements risked greater divergence across modes, especially when different communication channels and interviewer presence could influence respondent behaviour. Nevertheless, the likely level of consent for follow-up studies was judged to be relatively high across most designs, with the exception of web-only, where the absence of interviewer interaction raised uncertainty about respondents' understanding of the study and its multi-stage structure.

Key RDMF Effects

If the RDMF were available and access to individual-level data was permitted, the following factors would impact on the assessment of coherence:

- If names were available, higher initial response rates expected from personalised communications would increase the pool of respondents eligible for the diary stage.
- Reduced reliance on interviewer-led modes would lower the risk of inconsistencies in measurement associated with changes in mode.
- Enhanced ability to tailor mode allocation could ensure that respondents with lower digital confidence receive appropriate support, improving the consistency of participation across both components.

Expected Change

Coherence would be expected to improve under an RDMF-based design, particularly for web-first and web-only approaches, which would become more naturally aligned with the digital format of the travel diary. Concerns about the lack of interviewer interaction in securing consent may be reduced through more personalised and clearly targeted communications, which can improve respondents' understanding of the purpose and legitimacy of the survey. Mixed-mode designs would also benefit from reduced reliance on telephone or face-to-face follow-up, both of which previously introduced shifts in survey environment that risked reducing diary participation.

Fully interviewer-led designs would still face a relative disadvantage, as the transition to the web-based diary involves a significant mode change. However, the overall distribution of coherence scores across designs would likely narrow under RDMF, with fewer structural barriers to ensuring that survey and diary data can be combined confidently, particularly as fewer mode transitions are required between stages of data collection.

6.5 Completeness

Completeness refers to the extent to which the survey gathers all the information required to meet its research objectives while minimising burden on respondents. In the WNTS Evaluate stage, this included assessing the likelihood of missing data, the feasibility of administering a 30-40 minute questionnaire, and the risk of respondent dropout across modes.

WNTS Assessment Using PAF

Under the PAF-based evaluation, completeness scored well across most designs. The WNTS Evaluate stage concluded that item non-response was likely to be low for the topic area, and that all shortlisted designs were capable of administering the required 30-40 minute questionnaire. Web and face-to-face approaches were assessed as particularly viable in supporting longer instruments, although telephone-based modes raised some concerns regarding respondent fatigue and dropout due to the cognitive demands of listening to and recalling response options.

At the unit level, PAF-based designs faced risks that were partly linked to mode. Self-administered modes could experience higher dropout if respondents perceived the questionnaire as overly long or burdensome, while interviewer-led modes reduced dropout but increased cost. However, overall, completeness was not a major point of differentiation between designs in the PAF evaluation, as all were assessed as very likely to generate data of sufficient breadth and depth.

Key RDMF Effects

If the RDMF were available and access to individual-level data was permitted, the following factors would impact on the assessment of completeness:

- Administrative data could potentially replace some of the demographic and socio-economic items traditionally asked in surveys, reducing questionnaire length.
- Reduced burden would lower the risk of respondent fatigue, satisficing, or dropout, particularly in self-administered modes.
- More complete population coverage may improve the ability to identify and target hard-to-reach groups at the sampling and follow-up stages, which could contribute to reductions in unit non-response, although this effect is uncertain.
- Richer auxiliary data would support more effective imputation for any remaining missing items.
- Improved personalisation of contact could increase engagement and reduce the likelihood of item-level missingness.

Expected Change

Completeness would be expected to improve under an RDMF-based design. The ability to shorten the questionnaire by drawing on administrative records would reduce respondent burden, enhancing both item and unit response, especially in web-first and web-only designs. The greater inclusiveness of the sampling frame would further reduce the risk of missing data associated with groups less likely to be captured by PAF. Although completeness was already a strong-performing dimension under the PAF, these enhancements would make self-administered modes more robust and lessen the dependence on interviewer-led follow-up to mitigate dropout. In summary, an RDMF-based approach would support more complete data collection across all modes while reducing the burden placed on respondents.

6.6 Relevance

Relevance refers to the extent to which the data generated by a survey meets users' information needs. In the WNTS Evaluate stage, this included assessing whether the mode(s) of administration would remain viable over the next 5–10 years, whether the design made effective use of technology, and whether it supported the analytical requirements and expectations of data users.

WNTS Assessment Using PAF

Under the PAF-based evaluation, designs incorporating web modes performed best on relevance because they aligned with long-term trends in digital data collection and reflected evolving expectations about flexible, respondent-centred survey participation. Web-first and mixed-mode approaches were seen as future-proof and consistent with the continued rise in online engagement. Fully interviewer-led designs, especially face-to-face, scored poorly on relevance due to social changes affecting the acceptability of unannounced visits, their limited capacity to leverage technology, and concerns about sustainability and operational resilience. Telephone interviewing performed somewhat better, given high smartphone penetration, but still lagged behind web-first options.

Key RDMF Effects

If the RDMF were available and access to individual-level data was permitted, the following factors would impact on the assessment of relevance:

- The sampling of individuals would support a more inclusive and granular understanding of the population, enhancing the interpretive value of outputs for policymakers.
- Administrative variables could potentially expand the range of possible breakdowns and support more detailed analysis at smaller geographic and demographic scales.
- Personalised digital communication enabled by RDMF-linked identifiers could align the survey design more closely with contemporary expectations for tailored, technology-enabled engagement. However, in the absence of telephone numbers or email addresses within the RDMF, these benefits would depend on the extent to which contact can be effectively achieved via postal communications, although reduced reliance on generic 'household' addressing may still improve engagement.
- Greater inclusivity and representativeness would strengthen the relevance of outputs for groups that are harder to reach under PAF.
- Reduced reliance on interviewer modes would support long-term sustainability, cost containment and futureproofing of data collection structures.

Expected Change

Relevance would be expected to increase notably under an RDMF-based design. Web-first and web-only approaches would become even more aligned with long-term trends in digital survey participation, particularly when supported by enhanced personalisation and more inclusive sampling. The improved granularity enabled by administrative data would strengthen the usefulness of the survey for policy and analytical users, and the reduced dependence on interviewer-based modes would enhance sustainability and adaptability over time.

In contrast, the relative relevance of face-to-face and telephone-heavy designs would decline, as the RDMF reduces the need for these modes to ensure representativeness. Overall, an RDMF-based approach would better meet emerging user expectations for flexible, digital-first, inclusive, and analytically rich survey data.

6.7 Timeliness

Timeliness refers to the extent to which survey data can be delivered within the timeframes required by users. In the WNTS Evaluate stage, this included assessing whether the survey could be launched by the required date and whether weighted datasets could be produced within three months of the end of the fieldwork period. It also considered how the choice of mode affects fieldwork length, processing time and the feasibility of meeting publication deadlines.

WNTS Assessment Using PAF

Under the PAF-based evaluation, all designs were judged capable of delivering weighted datasets in the required three-month timeframe. However, timeliness varied more strongly in relation to the feasibility of launching the survey by the mandated deadline. Single mode designs, particularly web only and face to face, were considered most likely to launch on

schedule because they required less programming, testing and operational complexity. Mixed mode designs, especially those involving multiple interviewer-led modes, scored lower due to the additional time required to adapt questionnaires for different modes, train interviewers, and set up multi-stage fieldwork systems.

The reliance on interviewer-led components also affected expected fieldwork speed. Web-first or web-only designs were expected to achieve faster cycles of response due to online completion, whereas face to face and telephone components lengthened fieldwork and introduced greater operational risks. Nonetheless, timeliness was not a major weakness for any design under the PAF, but some required more coordination and scheduling effort than others.

Key RDMF Effects

If the RDMF were available and access to individual-level data was permitted, the following factors would impact on the assessment of timeliness:

- Direct person-level sampling may simplify some aspects of sample design, although it would introduce new operational complexities, including linkage processes and validation of individual records.
- Reduced need for face-to-face follow-up has the potential to shorten fieldwork periods and eliminate delays associated with interviewer scheduling.
- Access to richer administrative variables would streamline weighting and calibration, reducing the time needed during the data processing stage.
- Higher initial response rates expected from personalised invitations and better-targeted contact strategies would accelerate case completion. Regular updates of RDMF improves the quality and timeliness of sample information.

Expected Change

Timeliness would be expected to improve slightly under an RDMF-based design, particularly for web-first and web-only modes, which would benefit from simpler operational logistics and faster early returns. In summary, although all designs were considered viable under PAF, the RDMF would strengthen the timeliness of nearly all approaches and would particularly enhance the speed and efficiency of digital-first designs.

6.8 Cost-effectiveness

Cost-effectiveness refers to the extent to which a survey design offers value for money. In the WNTS Evaluate stage, this involved assessing whether the design could deliver the required sample size within budget, whether the approach could scale cost-effectively if larger samples were needed, and whether the mode choices supported environmentally sustainable and resource-efficient fieldwork.

WNTS Assessment Using PAF

Under the PAF-based evaluation, cost-effectiveness varied sharply between designs. Web-only emerged as the most cost-efficient option because it did not require interviewer deployment, and its marginal cost per additional case was extremely low. Web-first mixed-mode designs were somewhat more expensive but still relatively efficient due to their reliance on online completion for a substantial share of respondents.

In contrast, designs reliant on face-to-face interviewing performed worst. The need to train, schedule and deploy interviewers across Wales significantly drove up costs and limited the achievable sample size, reducing the value-for-money proposition. Telephone interviewing was less expensive than face-to-face but still substantially costlier than web-based data collection, particularly for long questionnaires. Additionally, designs with heavy interviewer involvement were less environmentally sustainable because of travel requirements and higher resource use.

Key RDMF Effects

If the RDMF were available and access to individual-level data was permitted, the following factors would impact on the assessment of cost-effectiveness:

- More precise individual-level stratification would likely reduce design effects, meaning fewer completed interviews would be required to achieve the same level of statistical precision.
- Reduced reliance on interviewer-led modes would lower fieldwork costs, particularly for designs that previously required face-to-face or telephone follow-up to mitigate PAF-related coverage issues.
- Improved contact and engagement resulting from personalised invitations would reduce the need for expensive follow-up efforts.
- Streamlined weighting and processing supported by administrative data would reduce the analytical time needed post-fieldwork.
- Shorter questionnaires enabled by administrative data linkage would reduce both respondent burden and interview length, improving efficiency.
- Targeted follow-up, informed by RDMF attributes, would reduce wasted interviewer effort by focusing resources on cases most likely to benefit from additional contact.

Improvements in statistical efficiency also have implications for cost-effectiveness. Removing unequal selection probabilities reduces the design effect, meaning that fewer completed interviews are required to achieve a given level of precision.

For the WNTS design, the scale of this effect is uncertain, but is unlikely to be negligible. More generally, for conventional surveys that select a single adult per household, unequal selection probabilities typically introduce a design effect of around 1.2 to 1.3. Eliminating this component through equal-probability individual sampling would imply that the same effective sample size could be achieved with approximately 75–80% of the nominal sample size, representing a substantial potential efficiency gain.

Expected Change

Cost-effectiveness would be expected to improve significantly under an RDMF-based design. Web-first and web-only approaches would become even more economical because many of the corrective interviewer-led components needed under the PAF would no longer be necessary. Mixed-mode designs would also see cost reductions as targeted, rather than universal, interviewer follow-up becomes viable.

The gap between web-based and interviewer-heavy designs would widen further: face-to-face and telephone modes would remain the most expensive and least scalable options, but would

now deliver fewer marginal benefits, making them less justifiable from a value-for-money standpoint. Overall, an RDMF-based survey would more efficiently allocate resources by reducing fieldwork costs, lowering design effects, and allowing more focused use of interviewer time where it adds genuine value.

However, it is important to note that any cost associated with accessing the RDMF is currently unknown.

6.9 Usability

Usability refers to the ease and efficiency with which respondents can complete the survey, including how intuitive and accessible the design is, how well it supports respondents' preferences, and the extent to which it minimises burden. In the WNTS Evaluate stage, this included the flexibility offered to respondents in how and when they could participate, the availability of the survey in Welsh and English, and the inclusivity of different modes for individuals with varying levels of digital access or comfort.

WNTS Assessment Using PAF

Under the PAF-based evaluation, web-first mixed mode designs performed best on usability because they provided respondents with multiple ways to participate and offered flexibility in how and when the survey could be completed. Web surveys were judged particularly user-friendly due to their ability to support completion at respondents' own pace, across different devices, and in multiple sittings.

However, web-only designs were assessed as less inclusive, given that they did not offer an alternative for individuals with limited digital access or low digital confidence. Designs that relied entirely on interviewer-led modes, such as face-to-face or telephone, were seen as more restrictive because respondents had to accommodate interviewer schedules and had fewer options regarding timing and pace. All designs were able to support bilingual data collection, although interviewer-based modes required bilingual interviewer availability.

Key RDMF Effects

If the RDMF were available and access to individual-level data was permitted, the following factors would impact on the assessment of usability:

- Administrative data could potentially shorten the questionnaire by removing the need for some demographic and socio-economic questions.
- Personalised invitations and targeted contact strategies would increase respondents' understanding of the survey's legitimacy, improving initial engagement.
- Individual-level information would enable the design to anticipate digital access barriers and allocate appropriate modes, improving usability across different groups.
- Improved knowledge of individual characteristics may enable more effective tailoring of contact strategies and mode allocation, helping to reduce barriers to participation for specific groups.
- Interviewer-led modes can be more tightly targeted at those who are less likely to engage online, improving the overall alignment between respondent needs and data collection approach.

Expected Change

Usability would be expected to improve across all RDMF-based designs, with the most significant gains for web-first and web-only approaches. The ability to shorten the questionnaire, personalise communications, and tailor mode allocation would make the survey more accessible and adaptable to respondents' preferences. Web-based designs would potentially benefit from reduced dropout and improved engagement, while mixed-mode designs would gain flexibility through more targeted and efficient use of interviewer modes.

Interviewer-heavy designs would still offer strong usability for respondents with limited digital capability, but their comparative advantage would lessen because the RDMF would allow targeted support for these groups without requiring interviewer involvement for all cases. Overall, an RDMF-based approach would enhance usability by providing a more respondent-centred and streamlined experience.

6.10 Re-evaluated rankings

Overall, Design 3 (a push-to-web survey with face-to-face follow-up for non-responding addresses) is likely to remain the top-scoring design. It balances the efficiency of a web-first approach with the representational strengths and whole-population accessibility of face-to-face follow-up.

Under an RDMF-based sampling frame, this design becomes even stronger. The RDMF could improve the performance of web modes through personalised contact, richer stratification and more complete population coverage, while transforming the role of face-to-face follow-up: instead of covering all non-responding cases, interviewer visits could be targeted specifically at underrepresented groups identified from administrative data. This shift reduces cost and burden while preserving corrective power, enabling Design 3 to achieve the best overall balance across the Total Survey Quality dimensions in an RDMF-enabled context.

Design Option	Description	Overall Assessment Under RDMF	Re-evaluated ranking
Design 3	Web → <i>Targeted</i> Face to Face (CAWI → targeted CAPI)	Performs best overall. Web-first delivers strong efficiency, accuracy and usability under RDMF, while a targeted face-to-face component provides strategic follow-up for groups with persistently lower response propensities. This blended approach maximises quality without incurring unnecessary interviewer cost.	1
Design 2	Web-only (CAWI)	Remains a strong, highly cost-effective option and benefits significantly from improved representativeness under RDMF. However, without a targeted in-person follow-up, it may still underperform for a small number of digitally disengaged groups, limiting its performance relative to Design 3.	2
Design 4	Web → Telephone → Face to Face (CAWI → CATI → CAPI)	Gains less advantage under RDMF. The multi-mode sequence introduces complexity and potential mode effects that provide limited marginal benefit once representativeness improves. Strong but less efficient than Designs 2 and 3.	3
Design 5	Telephone → Face to Face (CATI → CAPI)	Reduced need for interviewer-led modes under RDMF weakens its justification. Higher costs and limited scalability remain key constraints, making it less suitable than web-first options.	4
Design 1	Face to Face only (CAPI)	Least competitive under RDMF. Interviewer-intensive designs become disproportionately costly and offer limited added value, as frame-driven representation issues are largely mitigated through individual-level sampling.	5

7. Cost Comparison Between PAF-Based and RDMF-Based Designs

This chapter compares the relative cost implications of implementing the WNTS under two sampling scenarios:

1. a traditional PAF based design, as modelled in the original WNTS evaluation, and
2. a potential RDMF based design, incorporating individual-level sampling and targeted follow-up.

The comparison presented here is based on achieving the same number of completed interviews under each design. It does not account for differences in statistical efficiency between designs, such as reductions in design effects under an RDMF-based approach. As a result, the cost estimates can be considered conservative, as they do not reflect potential reductions in the number of completes required to achieve a given level of precision.

Approach to costing

This section outlines the assumptions underpinning the cost comparison between the existing PAF based WNTS design and a potential RDMF based design. The comparison focuses on relative costs generated under each set of assumptions.

Costing assumptions: PAF-based design

Under the current PAF-based design, the WNTS aims to achieve 6,400 fully productive interviews with adults aged 16 and over living in private residential accommodation in Wales. The survey uses a stratified random probability sample, with all delivery points sorted by postcode and three stratification variables: Region, a composite Local Authority–Urban/Rural indicator, and the percentage of households with a car. Addresses within each region are then selected systematically, with probability proportional to the size of the address base. For practical purposes, the design is unclustered.

The survey employs a push-to-web mixed-mode design, with all sampled addresses first invited to complete the questionnaire online. Each selected address receives a bilingual invitation letter (English and Welsh) accompanied by a bilingual FAQs document. Approximately one week later, a reminder mailing is issued, prominently offering respondents the option to opt in to a telephone interview if preferred. A final reminder, issued a week after that, informs households that an interviewer will visit if no response is received.

All non-responding addresses are subsequently assigned to face-to-face field interviewers. Up to two eligible adults can complete the survey online, whereas the face-to-face element randomly selects one adult per household.

The costing assumes an 8% ineligible rate (vacant or non-residential addresses) and a 16% household-level web response rate, generating an average of 1.3 productive cases per responding household. For the face-to-face stage, a 30% household-level response rate is assumed. Combined, these yield an aggregate household response rate of approximately 41%, equating to an estimated individual response rate of around 25%. To achieve 6,400 completed interviews, an issued sample of 15,000 addresses is therefore required (NatCen, unpublished data, 2026).

Costing assumptions: RDMF-based design

Under the RDMF-based alternative, several key assumptions differ. The sampling unit is a named individual, allowing direct contact with the selected respondent. Because telephone numbers and email addresses are not included in the RDMF, the costing assumes a mail-based contact strategy comparable to the PAF design: up to three postal communications, with the first two requesting online completion and the third advising that field interviewers may visit.

The major design difference concerns face-to-face follow-up. Under the RDMF, it is assumed that the additional profile data available in the sampling frame removes the need to send all non-responding cases to face-to-face interviewers. Instead, only up to 20% of non-responders would be issued for interviewer follow-up, targeted at groups underrepresented in the web element based on known demographic characteristics.

Because the empirical coverage accuracy of the RDMF cannot yet be verified, the costing applies a provisional 3% ineligibility rate (individual no longer living or no longer living at the recorded address). This estimate is based on the assumption that the RDMF is more accurate than the PAF and is updated more regularly. However, this assumption is uncertain and may be an underestimate. Here it is used entirely indicatively and would need to be tested empirically before conclusions about cost robustness can be drawn.

Response rates under an RDMF-based design are unknown. Naming respondents and tailoring communications may increase response, but there is insufficient evidence to quantify this reliably. For costing purposes, therefore, two scenarios are modelled:

Option 1: Response rates equivalent to PAF-based design

- Web response rate: 16%
- Face-to-face (targeted) response rate: 30%

Under this scenario, achieving 6,400 productive responses would require issuing 31,300 named individuals, producing an overall response rate of approximately 21%.

Option 2: Higher web response rate under RDMF

- Web response rate: 25%
- Face-to-face (targeted) response rate: 30%

Under this scenario, achieving 6,400 productive responses would require issuing 22,300 named individuals, producing an overall response rate of around 30%.

In both cases, it is assumed that any improvement in response would manifest primarily in the web stage, given that the face-to-face element targets individuals with lower digital propensity. It is possible that response rates for targeted face-to-face follow-up may be lower than in the PAF design, as this stage focuses on individuals with lower response propensity. However, this effect is uncertain and has not been explicitly modelled.

Relative cost comparison

This section summarises the overall cost differences between the existing PAF based WNTS design and two RDMF-based alternatives, using total project cost estimates generated under the assumptions outlined in this chapter.

Under the assumption that response rates remain the same as in the PAF design (Option 1), the RDMF produces a 13% reduction in total survey costs. This reduction is delivered through efficiencies introduced by the RDMF, primarily through the reduction in cases requiring an interviewer follow-up. Although the RDMF Option 1 therefore requires a larger issued sample than the PAF design, the reduction in face-to-face fieldwork results in a lower total cost.

If named sampling and targeted communication lead to improved web response rates (Option 2), the RDMF-based design could achieve cost reductions of around 29%. Please note that these costs do not factor-in any additional cost for accessing the RDMF, as this is currently unknown.

Total Estimated Costs (Relative Only)

Design	Relative Cost	Saving in Cost Per Interview
PAF-based design	Baseline (100%)	—
RDMF Option 1 (Web response rate of 16%)	Approximately 87% of PAF cost	13%
RDMF Option 2 (Web response rate of 25%)	Approximately 71% of PAF cost	29%

Across both scenarios, an RDMF-based design produces meaningful cost savings compared with the PAF-based approach. The magnitude of these savings depends primarily on:

- the proportion of cases completing the web survey
- the number of non-responders requiring face-to-face follow-up
- the effectiveness of targeted follow-up using administrative characteristics
- the accuracy and inclusiveness of the sampling frame

8. Discussion and synthesis

The findings from this case study suggest that adopting an RDMF-based sampling frame for the Wales National Travel Survey has the potential to deliver meaningful improvements in both cost and quality.

The analysis indicates potential improvements across multiple dimensions of survey quality. These include enhanced population coverage, more effective stratification, improved targeting of follow-up activities, and stronger weighting and calibration based on richer auxiliary data. Together, these factors suggest that an RDMF-enabled design could support more representative and efficient survey outcomes, although the scale of improvement remains uncertain.

The most immediate implication is a reduction in total survey costs relative to the current PAF-based design. This is driven primarily by the ability to use RDMF profile information to target face-to-face follow-up more efficiently, reducing the requirement for the full interviewer workload seen in the existing push-to-web approach.

Under the PAF design, all non-responding addresses are issued to interviewers to safeguard representativeness and accessibility. Under the RDMF approach, we have assumed that around 20 percent of non-responders would require interviewer follow-up, with those cases targeted to individuals whose characteristics suggest they are underrepresented in the web respondent pool. This change alone accounts for the majority of the relative cost reductions observed in the modelling.

A further potential source of efficiency gain arises from the move to equal-probability individual sampling, which removes a common source of design inefficiency in household surveys. In standard designs, this effect alone can improve efficiency by around 20–25%, although the magnitude of the gain for the WNTS design specifically remains uncertain and therefore is not factored into the costs here.

While these findings indicate clear potential, it is important to reiterate that the scenario modelled in this report represents a future-state vision rather than an immediately achievable design. The current RDMF does not support the form of access or use assumed here, and significant legal, operational and public acceptability challenges would need to be addressed before such an approach could be implemented in practice.

In the nearer term, the most realistic applications of the RDMF are likely to involve hybrid approaches, where administrative data are used to enhance, rather than replace, address-based sampling frames. These approaches may deliver some of the benefits identified in this report, albeit to a lesser extent than the full counterfactual scenario modelled here.

Further, while the modelling indicates clear potential for cost efficiency, it also highlights the sensitivity of costs to assumptions about response rates. For the purposes of this report, it is assumed that the RDMF will support features such as named invitations, alongside improved coverage and more tailored communications, which may increase web response. The realisation of these impacts is therefore dependent on the availability and practical use of these features, particularly the availability of names, which cannot yet be confirmed.

Moreover, there is currently no empirical evidence on how respondents will behave when sampled and contacted through the RDMF. As such, response rate assumptions in this report are necessarily provisional, and the cost estimates should be interpreted with caution.

More broadly, several risks and uncertainties identified during the modelling indicate that further evidence is required before definitive conclusions can be drawn about the comparative costs of PAF- and RDMF-based survey designs.

First, the accuracy of the RDMF for survey sampling purposes needs to be established. The modelling adopted a provisional ineligibility estimate of 3 percent, but this has not yet been validated through field testing. If eligibility rates differ substantially, the required issued sample, and therefore costs, may also change.

Secondly, empirical testing is required to understand actual response rates when respondents are sampled and contacted as named individuals through the RDMF. Although improvements are plausible, the magnitude of any gains cannot be assumed. Conversely, there may be groups who respond less readily to named administrative contact, and this too needs to be explored.

Finally, there is scope to investigate the design effects associated with an RDMF-based design. If the richer auxiliary data and individual-level sampling support more precise weighting and stratification, it may be possible to achieve the same analytical precision with a smaller productive sample, yielding a further source of potential cost savings beyond those modelled here.

Taken together, the findings from this case study illustrate the considerable promise of RDMF-based survey designs, particularly the ability to implement a more efficient and targeted mixed-mode approach. At the same time, they underscore the need for further empirical work to refine the underlying assumptions and explore how the RDMF performs in practice when used as a sampling frame for social surveys.

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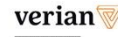
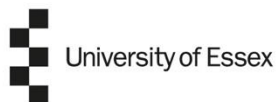
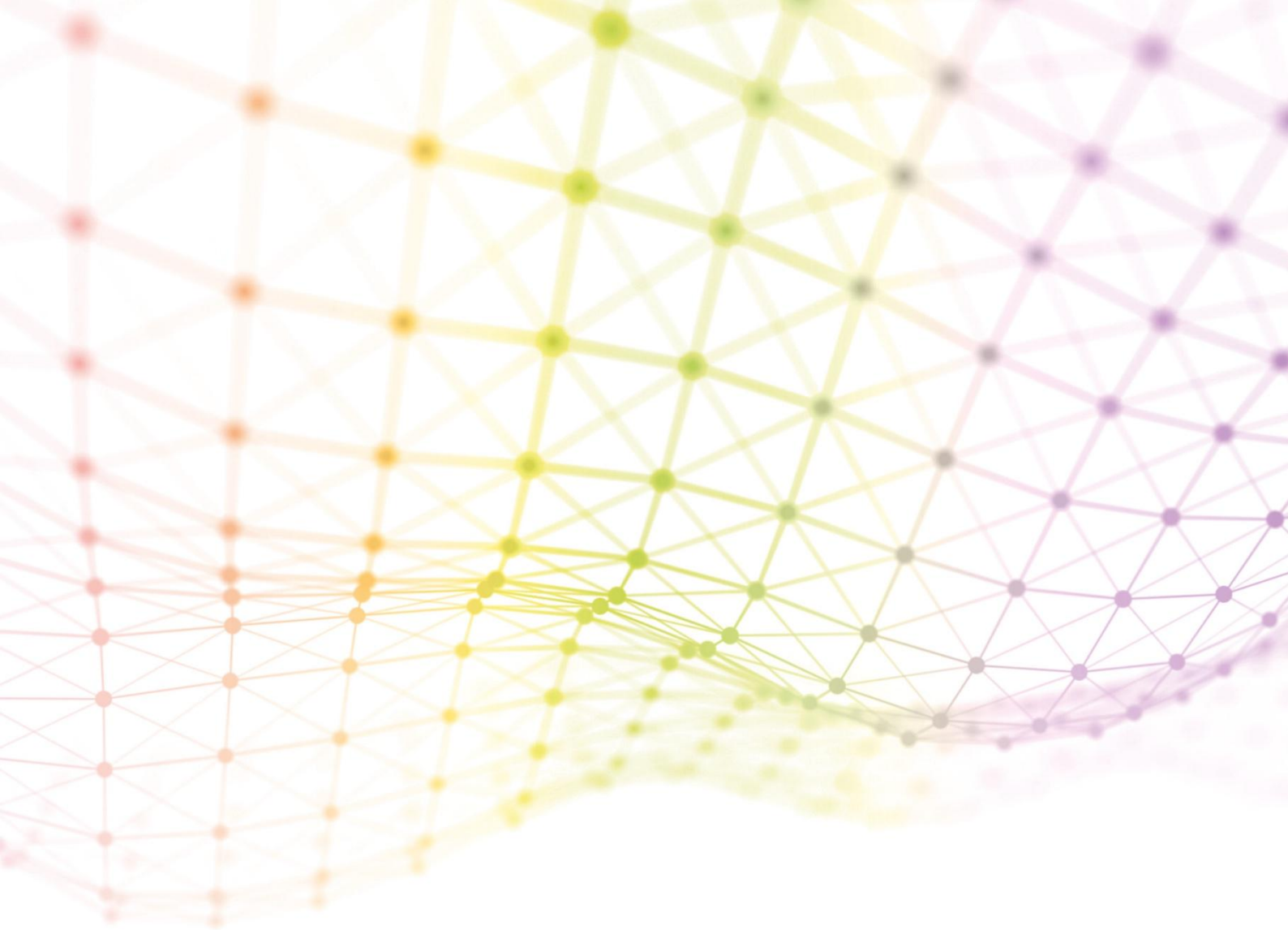
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