

The making of EVENS

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Introduction

During the COVID-19 pandemic in 2020, the Centre on the Dynamics of Ethnicity (CoDE) team along with Ipsos developed and implemented the Evidence for Equality National Survey (EVENS) and collected data between February and November 2021. The aim of the survey was to produce unrivalled high-quality data to document the experiences of ethnic and religious minority people in Britain during the COVID-19 pandemic. EVENS goes far beyond the limited number of ethnic minority groups that are typically reported in many UK national surveys, where surveys with small sample sizes prohibit the release of meaningful estimates and surveys with larger sample sizes typically focus on only five or six ethnic minority groups. Here, we report on the experiences of 20 ethnic minority groups, where appropriate disaggregated by age group, sex and geographical region. Prior to EVENS, no other survey comprehensively captured detailed experiences of ethnic minority groups. Hence, there was high demand for such a survey and support to implement an innovative online survey design.

The ambition of EVENS, to recognise and represent more ethnic minority groups than other surveys, to provide larger samples of ethnic minority groups, to ensure the relevance of the data to ethnic minority communities and to deliver high-quality data, required innovation in survey methods from questionnaire development to data adjustments after fieldwork. At the core of this innovation is an open invitation to ethnic minority people to take part in the survey. While ostensibly straightforward this approach creates challenges for making it possible to use the data in ways that can be said to be representative of ethnic minority people in Britain. This is because the open invitation to participate is contrary to established social science survey methods that, for example, invite people from specific addresses to take part, thus knowing who from their representative pool has and has not responded and allowing adjustments to be made to the dataset accordingly so that it can be confidently used as representative of the target population. These standard probability-based survey approaches cannot be used with an open invitation to participate such as that used in EVENS because the sample

cannot be drawn from a known representative pool of the population with an established sampling frame. Thus, EVENS is based on a non-probability survey approach and is one of the first large-scale applications of such a survey methodology in the social sciences.

This chapter outlines how EVENS was made; how the pioneering non-probability approach was implemented, from questionnaire development, recruitment strategies to the nature of the sample, quality assurance and weighting adjustments. We conclude with reflections on the opportunities provided by, and the challenges of, innovative non-probability survey approaches for understanding experiences of ethnic and religious minority people.

EVENS questionnaire development

The questionnaire content was driven by the primary aim of EVENS: to understand the experiences of ethnic and religious minority people in Britain during the COVID-19 pandemic. To develop the questionnaire content, it was important to obtain feedback and advice from EVENS voluntary, community and social enterprise (VCSE) organisation partners who helped shape the questionnaire in terms of content, question order and question wording in order to ensure that it was both relevant for their work and appropriate for the communities they engaged with in the course of their work and provision of services. Concurrently, the questionnaire had to meet the requirements of a non-probability survey, particularly in terms of including some questions common to those found in probability-based samples. This allows for statistical adjustments through survey weights to compensate for selection and coverage biases found in non-probability surveys. These questions should include key socioeconomic and demographic variables, and information on how the respondents are recruited into the survey and their motivation for participating. Typical variables that explain participation in an online survey are related to social involvement and attachment to society (Voogt and Saris, 2003). Other potential participatory variables are internet access, trust in political establishments, voting and volunteering.

The EVENS questionnaire is divided into topic-based modules, shown in [Box 2.1](#). Many of these are adapted from those in established probability-based surveys and others were developed specifically to capture constructs not covered (or not well-covered) in existing surveys, such as the impact of COVID-19 and experiences of racism and racial discrimination. The questionnaire was developed for both online and Computer Assisted Telephone Interviewing (CATI) data collection and was offered in 14 languages: Arabic, Bengali, Chinese, Gujarati, English, Polish, Portuguese, Punjabi (Gurmukhi), Punjabi (Shahmukhi), Romanian, Somali, Turkish, Urdu and Welsh. The questionnaire and its implementation received

Box 2.1: Topics in the EVENS questionnaire

1. *Demographic characteristics*. Including date of birth, sex and gender identity.
 2. *Household and accommodation*. Including household composition, tenure, type and location of accommodation, access to water and sanitation services, and house value.
 3. *Social cohesion and neighbourhood belonging*. Including feelings of belonging to neighbourhood and to local area, and internet access and use.
 4. *Ethnicity and migration*. With constructs measuring ethnic and religious identity, country of birth, year of arrival to Britain, nationality and feelings of belonging to England/Scotland/Wales.
 5. *Socioeconomic characteristics*. Including educational qualifications, current economic activity, number of hours worked, number of hours worked from home, occupation, impact of COVID-19 on employment, childcare and home-schooling, use of benefits and financial worries.
 6. *Racism and racial discrimination*. Including experiences of racism and racial discrimination over time and across domains, vicarious exposure, anticipation of discrimination and coping mechanisms.
 7. *Health*. Including general self-rated health, limiting long-term illness, depression (CES-D 8), anxiety (GAD-7), chronic conditions, COVID-19 infection and related symptoms, experiences accessing the NHS, caring and receipt of care, receipt of and attitude towards the COVID-19 vaccine, and experiences of bereavement.
 8. *Social isolation*. Including feelings of loneliness and isolation, and ways of connecting with others.
 9. *Black Lives Matter (BLM)*. Including participation in protests and support of the BLM movement.
 10. *Attitudes towards the police*. Including confidence and trust in the police, being stopped by the police since the start of the outbreak of the COVID-19 pandemic, and overall sense of police activity in the community.
 11. *Political participation*. Including trust in local and national governments in relation to managing the pandemic, interest in politics and voting intentions.
 12. *Additional demographics*. Including marital status, sexual orientation, personal and household income, and immigration status.
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full ethical approval from the University of Manchester Research Ethics Committee.

Recruitment to the survey

In any non-probability survey, recruitment strategies need to ensure representation of the target population. This was even more important for

EVENS as we aimed to collect data from a wide range of ethnic minority groups across age groups, sex and geographical regions. To facilitate the advertising of the survey, we allocated budget for the branding of the survey, a dedicated website from which the survey could be accessed and the development of a (predominantly online) marketing strategy. We held highly publicised online events to promote the survey, including an online launch event on the day the survey went live (February 2021), which included high-profile speakers from our VCSE partners. In addition, a steady stream of focused traditional and digital media campaigns was launched, particularly in ethnic and religious minority media outlets.

Partnerships with leading VCSE organisations in the race equality sector in Britain were central to the marketing strategy. Partners supported events, distributed recruitment materials via their mailing lists and in-house advertising, hosted events, spoke about EVENS in media coverage and worked with their networks to engage survey participants. Additionally, they advised on specific advertising channels (such as bespoke mailing lists and community media). The VCSE organisations ensured EVENS achieved broad coverage of the target ethnic minority groups and sufficient geographical coverage of Britain.

To ensure that only eligible persons (belonging to an ethnic minority group, 18 and over, and living in Scotland, Wales or England) took part in the main online survey, an open-link registration survey was first set up as a screening instrument and included preliminary questions to determine eligibility. The registration survey also included information about the survey with an opt-in routing question, questions on how the individual was recruited into the survey and the selected language. If the individual was found to be eligible, a unique link was provided to the main online survey. On completion of the survey, the individual received an additional four links to pass on to family and friends (the ‘snowball’ sample). A dedicated telephone number on the Ipsos website also made it possible to complete the questionnaire via telephone (CATI) instead of online. Participation in the survey was incentivised with the offer of a £10 gift voucher which was provided after completion of the survey.

The EVENS sample

EVENS aims to provide detailed information on the experiences of the COVID-19 pandemic for ethnic minority people and, in addition, to obtain data to enable robust reporting and analysis for more detailed ethnic minority groups than typically appear in probability-based surveys. Overall, results in this book are provided for 21 ethnic groups (including those identifying as Jewish, the White British group, any other White background, any other mixed/multiple background and any other ethnic group). Ethnic minority

groups were targeted during data collection for a range of age groups (18–24, 25–34, 35–44, 45–54, 55–64, 65 and over), sex (male, female) and region of the UK (East Midlands, East of England, London, North East, North West, Scotland, South East, South West, Wales, West Midlands, Yorkshire and the Humber). To ensure we recruited enough people in each ethnic minority group for robust statistical analysis, we carried out data collection monitoring. For this we calculated desired sample sizes (quotas) for each age-specific, regional ethnic minority group. Due to small sample sizes, we combined Black African Sub-Saharan and Other Black African for a final 17 ethnic minority groups, as shown in [Table 2.1](#). Ethnic minority groups not specially monitored were White British, Any other White, Any other mixed and Any other ethnic group. In addition, religious groups were not specifically monitored in the data collection (except for Jewish people) as we anticipated that they would be sufficiently captured within the ethnic minority samples. We aimed for a sample covering the 17 ethnic minority groups of approximately 12,000 individuals.

To specify the desired sample sizes (quotas), we first needed to obtain the British population totals for each monitored ethnic minority group by age group, sex and region. One important source of data for estimated counts of ethnic minority groups between national censuses is produced by the ‘ETHPOP’ project ([Wohland et al, 2018](#), extracted for year 2020). Data are provided in two-year age groups, by sex and by region, and include the following ethnic groups: Bangladeshi, Black African, Black Caribbean, Chinese, Indian, Mixed, Other Asian, Other Black, Other ethnic groups, Pakistani, White British and White other.

Next, the ETHPOP distributions were adjusted to current population benchmarks. The population benchmarks were obtained from weighted survey counts of the 2019 UK Annual Population Survey where the survey weights are calibrated to official 2019 mid-year population estimates released by the Office for National Statistics (ONS). We applied a multivariate method (Structure Preserving Estimation [SPREE] [[Purcell and Kish, 1980](#)]) of calibrating the ETHPOP distributions of ethnic minority group by region, sex and age group to the population benchmarks. This procedure preserves the existing structure and proportions of the ethnic minority groups in the ETHPOP database and ensures that the totals by region, sex and age group equal the population benchmarks. For ethnic minority groups that did not have projected population totals in the ETHPOP data, we pro-rated from the derived proportions from the 2011 UK Census.

The updated estimates for the population by ethnic minority groups, age group, sex and region were used to allocate our target total sample size of 12,000 across ethnic groups ([Table 2.1](#)). For some ethnic minority groups that are traditionally under-represented in probability-based surveys, the target quota represented an oversampling relative to their proportion in the

population, to give a minimum target sample of 375. This meant that other ethnic minority groups were undersampled. The final desired sample sizes (quotas) for the data collection monitoring and the achieved sample size for all ethnic minority groups are shown in [Table 2.1](#). There is high variability in the achieved sample sizes compared to the proportional sample sizes due to the undersampling and oversampling, and a relatively small sample collected for the White British group, and this had implications for the variability of the final survey weights and width of confidence intervals.

Data collection and monitoring

The final sample of EVENS included data collected via a variety of pathways: the main survey from the online data collection (supplemented with CATI and some face-to-face interviews), established web panels from Ipsos and the commercial Prolific panel, as well as some face-to-face interviews with people from Gypsy/Traveller and Roma groups (to be discussed later). The final sample sizes of the different sample components of EVENS are in [Table 2.2](#). The sex, age and regional characteristics of the survey weighted (to be discussed later) ethnic groups in the EVENS sample are shown in [Table 2.3 \(a and b\)](#). The final sample size was 14,221 participants.

Targeted data collection was carried out mainly through focused mainstream and social media campaigns and working with partner VCSEs to develop and implement recruitment strategies for those under-represented groups. To increase sample sizes, we were able to include ethnic minority panel members from the established ‘Custom Panel’ of Ipsos as well as their probability-based online panel, ‘Knowledge Panel’. We also drew ethnic minority sample members from a commercial panel, Prolific (see <https://www.prolific.co/>). Efforts to improve the data collection with respect to the desired sample sizes (quotas) were filtered through the panels – for example, panel members were oversampled if they belonged to ethnic minority groups or lived in Scotland or Wales.

Daily monitoring of the responses to EVENS was essential for ongoing quality checks and ensuring that the desired sample sizes (quotas) were being met. In the spirit of responsive survey designs from the probability-based survey literature ([Groves et al, 2006](#); [Schouten and Shlomo, 2017](#)), we reviewed all univariate and bivariate cross-tabulations of the ethnic minority groups by age group, sex and region on a daily basis to identify specific groups which were in need of targeted recruitment. We also assessed the representativeness of the collected sample data using a Representativity (R-) Indicator ([Bianchi et al, 2019](#)). The R-Indicator provides a single quantitative measure to assess the variability of subgroup response rates, in this case for the cross-classified variables of ethnic minority group, age group, sex and region. If the response rates are all the same in each subgroup, the maximal

• TABLE 2.1: ALLOCATION OF THE PROPORTIONAL SAMPLE, THE DESIRED SAMPLE SIZE AFTER OVERSAMPLING OF ETHNIC MINORITY GROUPS AND ACHIEVED SAMPLE SIZE OF THE EVENS SURVEY

Ethnic group	Adjusted sample size by proportion in population		Desired sample size (quota)		Achieved sample size	
	N	%	N	%	N	%
In quotas						
White Irish	757.50	6.31	750	6.25	118	1.41
White Eastern European	1,682.25	14.02	975	8.13	363	4.34
Gypsy/Traveller	41.25	0.34	375	3.13	251	3.00
Roma	41.25	0.34	375	3.13	73	0.87
Jewish	316.50	2.64	750	6.25	674	8.06
Indian	1,965.00	16.38	1,350	11.25	1,288	15.40
Pakistani	1,337.25	11.14	975	8.13	866	10.36
Bangladeshi	469.50	3.91	900	7.50	406	4.86
Mixed White and Asian	329.25	2.74	375	3.13	525	6.28
Chinese	801.00	6.68	750	6.25	664	7.94
Any other Asian background	1,173.00	9.78	750	6.25	673	8.05
Black Caribbean	663.00	5.53	900	7.50	566	6.77
Mixed White and Black	411.75	3.43	375	3.13	355	4.25
Black African	1,246.50	10.39	1,275	10.63	1,049	12.54
Mixed White and Black	160.50	1.34	375	3.13	159	1.90
African	283.50	2.36	375	3.13	180	2.15
Any other Black background	321.00	2.68	375	3.13	152	1.82
Total	12000.00	100.00	12000	100.00	8362	100.00
No quotas						
Any other White background					698	
Any other mixed/multiple background					378	
Any other ethnic group					270	
White British					4,513	
Total					5,859	
Overall total					14,221	

● TABLE 2.2: FINAL SAMPLE SIZE OF THE EVENS SURVEY, BY SAMPLE COMPONENTS ●

Component	Sample size		
		Ethnic minority groups	White British
Main Survey	3,292		114
Panels	3,554		4,114
Prolific	2,862		285
Total	9,708		4,513
		Total	Total
			3,406
			7,668
			3,147
			14,221

value of the R-Indicator would be 1. The final R-Indicator of the EVENS sample was 0.434, a relatively low value from the maximal representativeness that is indicative of the achieved sample sizes having large differences from their proportional sample sizes (see [Table 2.1](#)). This results in high variability in the final survey weights.

An example of a responsive design intervention to EVENS data collection as a result of sample monitoring was the introduction of face-to-face interviews with Roma and Gypsy Traveller people. Monitoring of responses revealed that fewer people than were needed from these ethnic groups were taking part in the survey and thus there was a need for targeted recruitment. In close collaboration with EVENS partner organisation Friends, Families and Travellers (FFT), two key barriers to participation were identified: lack of trust based on concerns that taking part in the survey could be detrimental to individuals (and that anonymity could not be assured); and lack of motivation emanating from a sense that the survey would not produce any benefit for the communities. In response, the EVENS team together with FFT and with support from Ipsos developed a community interviewer approach to Roma and Gypsy Traveller participation. Seven community interviewers were trained to support people in completing EVENS online by conducting interviews face to face within Roma and Gypsy Traveller communities. The approach was successful, recruiting 324 participants who identified as Roma or Gypsy Traveller and uniquely enabling the documentation of their experiences and inequalities in relation to other ethnic groups.

Ensuring data quality

Early in the fieldwork period, quality checks through daily monitoring by the EVENS team and Ipsos identified abnormalities in data indicating potential sample quality concerns. The survey was paused for a period of weeks to allow additional quality checks to be embedded in order to ensure that only legitimate responses to the survey were recorded. Additional quality checks included a weekly Bespoke Data Quality Monitoring process, undertaken collaboratively by the EVENS team and Ipsos. This included the introduction of stronger ‘digital fingerprinting’, a computational process that can identify and track internet users and devices online and ensure single responses from IP addresses. For the EVENS open-link design, this meant that any ‘snowball’ links that were given to participants to pass on to family and friends would be deemed problematic if they were using the same IP address as the link participant. Therefore, an identical survey platform was built for family members with the same IP address to access EVENS. Other additional checks included a ‘reCAPTCHA’-type question, posting out the vouchers following an email verification instead of sending electronic vouchers by email automatically on completion of the survey, monitoring

● TABLE 2.3: THE EVENS SAMPLE: A) ETHNIC GROUPS BY

Ethnic group	Sex		Age group				
	F	M	18-24	25-34	35-44	45-54	55+
White Irish	50.50	49.50	7.40	13.00	24.60	19.50	35.50
White Eastern European	48.60	51.40	14.20	44.30	26.40	8.80	6.30
Gypsy/Traveller	49.60	50.40	18.10	19.50	30.90	18.00	13.40
Roma	49.00	51.00	18.50	20.90	31.30	23.30	6.00
Jewish	51.90	48.10	10.20	15.70	15.20	15.30	43.60
Any other White background	51.90	48.10	12.50	28.20	33.80	14.40	11.10
Indian	48.70	51.30	11.10	24.10	24.80	15.20	24.80
Pakistani	48.70	51.30	17.70	24.90	24.80	16.00	16.60
Bangladeshi	48.20	51.80	19.60	24.20	25.00	16.70	14.50
Mixed White and Asian	47.90	52.10	24.50	28.20	19.50	13.30	14.50
Chinese	53.30	46.70	17.90	42.20	16.00	9.30	14.60
Any other Asian background	50.70	49.30	13.70	24.60	23.40	19.70	18.60
Black Caribbean	54.60	45.40	10.00	14.20	14.00	20.80	41.00
Mixed White and Black Caribbean	50.90	49.10	28.10	26.60	18.30	13.80	13.10
Black African	50.40	49.60	16.00	23.80	23.40	20.90	16.00
Mixed White and Black African	50.40	49.60	20.30	29.30	22.20	15.20	13.00
Any other Black background	49.50	50.50	19.90	20.80	18.70	20.40	20.10
Arab	39.80	60.20	16.10	27.20	25.80	16.00	14.90
Any other mixed/multiple background	52.70	47.30	19.60	31.00	20.40	13.30	15.70
Any other ethnic group	46.40	53.60	12.00	25.30	25.30	17.80	19.60
White British	51.30	48.70	9.50	14.50	13.80	17.10	45.10
Total	51.10	48.90	10.60	17.00	16.10	16.90	39.40

the email addresses of the respondent, and quality checks on the duration of completing the questionnaire and the quality of write-in text.

In addition, a series of logic checks on the weekly collected sample were carried out by the EVENS team to verify participants. These included the following checks: the language used for the survey and the ethnic group identification of the participant was not incongruous; participants' ages compared with the ages they provided separately for members of the household (including themselves); a very high number of people in the household ($n > 15$); whether the ethnic group was consistent with the VCSE partner through which they heard about the survey; the number of people in the household compared with the number of people who contributed to household finances; highest level of qualification and whether this was consistent

AGE AND SEX AND B) ETHNIC GROUPS BY REGION OF BRITAIN ●

Region											
North East	North West	Yorkshire and Humber	West Mid-lands	East Mid-lands	East of England	South West	South East	London	Wales	Scotland	N (weighted)
2.80	2.10	2.10	9.90	7.10	5.40	4.70	9.30	30.90	4.90	13.10	158.60
1.70	4.90	4.90	7.90	8.90	10.50	5.50	13.20	25.10	3.00	12.40	225.70
2.00	2.00	2.00	8.20	5.80	27.90	3.70	21.50	15.30	2.80	0.60	45.70
0.00	0.00	0.00	3.20	36.20	11.30	7.80	0.00	32.40	0.00	0.00	45.00
0.70	3.20	3.20	3.10	1.20	13.60	2.40	7.60	54.10	0.40	2.50	63.30
1.10	3.90	3.90	3.60	4.60	11.20	5.80	17.40	40.00	1.80	5.30	491.00
0.90	4.80	4.80	15.20	11.50	6.40	2.60	11.00	36.10	1.50	2.40	394.90
1.50	18.70	18.70	20.10	3.90	5.60	0.90	7.90	19.60	0.70	5.60	274.20
1.80	4.60	4.60	11.80	2.00	7.60	2.00	6.70	47.00	5.50	0.90	99.40
1.40	8.40	8.40	7.70	5.20	10.30	6.40	16.60	29.90	2.80	1.60	64.30
2.50	6.30	6.30	8.90	5.70	7.60	4.00	13.50	29.10	2.40	7.90	151.00
0.80	4.50	4.50	8.40	5.60	7.00	3.10	14.80	43.20	3.00	2.80	245.90
0.10	4.10	4.10	14.50	5.00	7.10	2.30	7.70	53.10	0.80	0.70	139.20
1.80	9.40	9.40	15.90	11.20	6.50	6.00	11.00	25.10	2.20	1.10	83.50
1.20	4.40	4.40	6.80	4.50	8.20	2.60	9.50	52.20	1.30	2.70	263.00
0.70	7.50	7.50	3.50	3.70	10.80	3.90	12.00	35.10	1.80	1.00	30.20
0.70	0.80	0.80	13.50	2.50	5.20	2.00	13.10	56.60	0.30	1.30	59.20
0.70	2.60	2.60	6.50	4.10	5.70	4.40	6.50	34.60	14.50	14.80	62.30
1.20	6.20	6.20	6.20	4.70	10.00	6.80	12.70	38.60	3.60	1.30	61.50
1.00	6.20	6.20	8.10	3.80	6.90	4.00	9.90	48.20	3.70	2.20	95.50
4.80	9.00	9.00	8.90	7.90	9.90	10.10	14.60	7.10	5.70	9.80	11,167.70
4.00	8.30	8.30	9.10	7.60	9.60	8.70	14.00	13.60	5.00	8.70	14,221.00

with their age; or for multiple IP addresses, whether there was consistent reporting of the number of people in the household, the age structure of the household and the geographical location.

Data adjustments after fieldwork: imputation

Following the completion of data collection, a number of adjustments were made to the EVENS data. First, we ensured that the survey responses were as complete as possible. Out of the 14,221 participants in EVENS, there were 121 cases where the respondent abandoned the online questionnaire after completing more than half of the questions; these cases were retained

in the sample. To ensure the data from these respondents were as complete as possible, information was calculated (or imputed) for missing variables based on what was already known about the respondents.

A nearest-neighbour random hot deck imputation approach (Kalton and Kasprzyk, 1986) was used to identify a single donor (another participant in the sample) for imputing the missing values of the abandoned case. In this method, we looked for a ‘nearest neighbour’ for the abandoned case out of all potential donors by calculating a (Gower’s) distance metric (Gower, 1971) on all previous completed questions that had a full response. In order to minimise the number of comparisons between each abandoned case and all potential donors, we only looked for donors if they matched exactly on: sex, age group, ethnic group, region, education and employment. If there was more than one donor for an abandoned case, we selected one donor randomly. Furthermore, once a donor was used for imputation, it was taken out of the selection pool for the next abandoned case, so a donor was only used once. All imputed cases have a flag so that they can be identified in the EVENS dataset.

Data adjustments after fieldwork: survey weights

Work was undertaken to account for potential biases in the sample. Biases are inherent to all data. However, in order to enable EVENS to be used in ways that can be said to be representative of ethnic minority people in Britain, it was necessary to understand the biases and create correction factors (survey weights). As EVENS is a non-probability sample, it was necessary to produce weights to account for biases in population characteristics (coverage biases) and biases in terms of data being from people who were more likely than others to take part in the survey, and to answer in particular ways (selection bias). So, the complex data processing and statistical techniques used to produce survey weights were imperative to make the EVENS sample mirror the characteristics of the British population. The weights are correction factors assigned to each respondent in the survey that, when applied during data analysis and reporting, make the responses of some (categories of) people (who are under-represented in the data) count for more than others (who are appropriately or over-represented in the data).

The EVENS weights were calculated based on a quasi-randomisation approach that uses propensity scores estimated through a statistical model on an integrated dataset which contains both the non-probability EVENS sample and a probability-based reference sample. Based on the propensity scores, a pseudo-design weight was estimated for each respondent in EVENS. This was followed by a calibration step to ensure that the final survey weights in EVENS totalled the population benchmarks within weighting classes (defined below). This approach introduces ‘randomisation’ into

the non-probability sample which will allow for statistical modelling and generalisation to the target population (in a similar way in which probability-based surveys can be used).

The four weighting variables that were used to calibrate the pseudo-design weights in EVENS were region, age group, sex and ethnic group. The calculations required data on these variables for all respondents. This necessitated some imputation of weighting variables within the EVENS dataset for 254 missing values on age group, 43 missing on sex, 32 missing on ethnic group and 8 missing on region. Similar to the method used for imputations of the abandoned cases, a nearest neighbour hot deck donor imputation using the Gower's distance metric was used. We implemented a simulation study to assess the best strategy for imputing missing weighting variables and the most successful approach was to find the donor with the smallest Gower's Distance on 37 matching variables. All imputed cases have an appropriate flag and can be identified in the EVENS dataset.

Preparing population benchmarks for survey weights

Similar to the calculation of the desired sampled sizes (quotas), we needed to calculate 2020 population benchmarks by ethnic group, age group, sex and region to be used in the calibration of the EVENS weights. Again, we used the ETHPOP database with projections to 2020 (and featuring a 'Brexit' scenario) with further disaggregation of ethnic minority groups according to proportions derived from the 2011 UK Census. We then updated the ETHPOP estimates using the official 2020 mid-year population estimates by age group, sex and region released by the ONS according to the SPREE method.

In some cases, we also used external considerations to obtain updated information about the population size of an ethnic minority group. For example, it was considered that the Roma and Gypsy/Traveller ethnic groups were substantially under-represented in the UK 2011 Census and hence do not appear in the official 2020 mid-year estimates. We therefore used external information for these populations (see, for example, Brown et al, 2013) for estimates of the Roma population according to geographical location and applied growth factors where relevant. We hope to recalculate population benchmarks using the 2021 UK Census in the future (the data were not available at the time of writing).

At the end of the process, we obtained updated population benchmarks for the cross-classified weighting variables for a total of 2,310 weighting classes (11 regions \times 2 sex \times 5 age groups \times 21 ethnic groups). The definition of the weighting variables is shown in [Box 2.2](#).

Due to small sample sizes for older people in EVENS, we had to combine the 55–64 age group with the 65 and over age group. It was also found that

Box 2.2: EVENS weighting variables

Region – London/South East/South West/East of England/East Midlands/West Midlands/
Yorkshire and Humber/North West/North East/Scotland/Wales

Sex – Male/Female

Age Group – 18–24/25–34/35–44/45–54/55+

Ethnicity – White: British (English/Scottish/Welsh [excluding Northern Ireland])/White:
Irish/White: Eastern European/White: Gypsy/Traveller/White: Roma/White: Any other
White background/Jewish/Asian: Indian/Asian: Pakistani/Asian: Bangladeshi/Mixed:
White and Asian/Asian: Chinese/Asian: Any other Asian background/Black: Caribbean/
Mixed: White and Black Caribbean/Black: African/Mixed: White and Black African/
Black: Any other Black/African/Caribbean background/Other: Arab/Other: Any other
ethnic group/Mixed: Any other mixed/multiple background

605 out of the 2,310 weighting classes had a zero sample size in EVENS. We therefore had to combine weighting classes by collapsing the region variable for those sparse ethnic minority groups. The final number of weighting classes was 1,705.

Preparing the probability reference sample

We used the Annual Population Survey (APS) 2019 and 2020 data (ONS, Social Survey Division, 2020, 2021) and the European Social Survey (ESS) rounds 8 and 9 (European Social Survey, 2016, 2018) to create a probability reference sample for those aged 18 and over in England, Wales and Scotland. The APS had 378,716 respondents and the ESS had 3,916 respondents. The APS provides information on key socioeconomic variables that overlap with those collected in EVENS, and the ESS collects data on attitudes and social participation which can explain selectivity mechanisms for participating in an online non-probability survey.

The first step was to statistically match the ESS to the APS (D’Orazio et al, 2006) where we assumed that the APS is the base file. The aim was to bring the participation variables from the ESS over to the APS dataset. Using the Gower’s Distance, we identified the nearest neighbour for each ESS respondent in the APS according to common sociodemographic variables shown in Table 2.4 and attached the ESS participation variables (shown in Table 2.5) to the APS. To reduce computation time, we required an exact match on a two-year band of age. In Table 2.6 we show summary statistics of the Gower’s distances in the statistical matching stage of the ESS to the APS.

• TABLE 2.4: MATCHING VARIABLES COMMON TO THE ANNUAL POPULATION SURVEY (APS) AND THE EUROPEAN SOCIAL SURVEY (ESS) •

Variable	APS	ESS	Harmonised measurement
Age	AGE	agea	Single year age
Economic status	INECAC05	mnactic	1 Employed 2 Unemployed 3 Retired 4 Sick/Disabled 5 Student 6 Other
Education	HIQUL15D	eduagb2	1 Degree or equivalent 2 Higher Education 3 GCE, A level, GCSE or equivalent 4 Other/no qualifications. 5 Over 70
Ethnicity	ETHGBEUL	anctry1	1 British 2 Other White 3 Black/African/Caribbean 4 Other Asian 5 Pakistani/Bangladeshi/Indian 6 Chinese 7 Other
First digit of occupation	SC10MMJ	isco08	First digit of the occupation
Gender	SEX	gndr	1 Male 2 Female
Marital status	MARSTA	maritalb	1 Married 2 Civil 3 Separated 4 Divorced/Dissolved 5 Widowed/Partner died 6 Other
Region	GOR9D	region	Government office regions

The next step was to mass-impute the ESS participation variables in the statistically matched APS/ESS dataset for all remaining records. We used a method called fractional hot-deck imputation (FHDI), which creates a single complete dataset with ‘fractional weights’ for each potential imputed value (Kalton and Kish, 1984; Kim and Fuller, 2004; Kim, 2011; Im et al, 2018). The imputation approach uses a two-stage process as follows: first, imputation cells are formed by cross-classifying predictor variables (ethnic group, marital status, education, broad occupation, economic status, sex and age) in order to be able to match potential donors to recipients. The units

• TABLE 2.5: EUROPEAN SOCIAL SURVEY (ESS) PARTICIPATION VARIABLES •

Variable	ESS	Measurement	Short question
Vote	vote	1 Yes, 2 No, 3 Not Eligible	Voted last national election
Interest in politics	polintr	1 Very ... 4 Not at all	How interested in politics
Subjective general health	health	1 Very good, 2 Good, 3 Fair, 4 Bad, 5 Very bad	Subjective general health
Religious events	Rlgratnd	1 Every day ... 7 Never	How often attend religious services apart from special occasions
Religiosity	Rlgrdgr	0 Not at all ... 10 Very	How religious are you
Citizen of the country	Ctzcncr	1 Yes, 2 No	Citizen of country
Trust in parliament	Trstprl	0 No trust ... 10 Complete trust	Trust in country's parliament
Trust in the police	Trstplc	0 No trust ... 10 Complete trust	Trust in the police
Member of a discriminated group	Dscrgrp	1 Yes, 2 No	Member of a group discriminated against in this country

• TABLE 2.6: SUMMARY STATISTICS OF GOWER'S DISTANCES IN THE MATCHING OF THE ANNUAL POPULATION SURVEY (APS) AND THE EUROPEAN SOCIAL SURVEY (ESS) •

Summary statistics	Value
Min.	0.000
1st Quartile	0.000
Median	0.003
Mean	0.000
3rd Quartile	0.000
Max.	0.140

with complete data serve as donors, and units with at least one missing item serve as recipients. In the second stage, each possible value for the missing item is assigned a ‘fractional weight’ representing the likelihood of being the true value. Since our variables were all categorical, the final imputed value we chose was the one with the highest fractional weight. In case of equal fractional weights, we drew a value at random.

Calculating the probabilities of participation and pseudo-design weights

Stacking the EVENS sample with the APS/ESS reference sample, we used a statistical model to estimate propensity scores where the dependent variable takes a value of 1 if the individual responded to EVENS, otherwise the dependent variable takes a value of 0. The independent variables in the model are: age group, sex, region, ethnic minority group, economic status, education, marital status, occupation, trust in Parliament, trust in police, interest in politics, subjective general health, member of a discriminated group and an interaction term of the subjective general health variable with broad ethnic group. Note that these independent variables included both key sociodemographic variables and participation variables. We implemented the method proposed in [Chen, Li and Wu \(2019\)](#) to estimate the propensity scores where we carried out the estimation separately for White British and All other ethnic groups.

Following the estimation of the propensity scores, we obtained the pseudo-design weight by sorting the EVENS dataset by the estimated propensity score and producing 20 groupings of equal sizes. Within each group, we calculated the average propensity score and took its inverse to obtain the pseudo-design weight for all individuals in EVENS in that group. The

• TABLE 2.7: DISTRIBUTIONS OF ALTERNATIVE WEIGHTING SCHEMES OF EVENTS •

Weights	Minimum	Maximum	Median	Mean	Standard deviation	Coefficient of variation	Increase in variance
Calibration only	36.4	24,549	1,230.1	3,632.9	4,187.2	1.15	1.33
Propensity score stratification and calibration	1.0	66,852	1,072.4	3,632.9	6,067.3	1.67	2.79

propensity score stratification method allows for smoother pseudo-design weights compared to taking the inverse of the propensity score.

Calibration to population totals

To calibrate the pseudo-design weighted EVENS to population benchmarks, we carried out an iterative proportional fitting procedure (raking ratio adjustment) (Kalton and Kasprzyk, 1986) using all two-way interactions of the weighting variables: region, age group, sex and ethnic group. This ensures that all survey weighted estimates from EVENS sum to the population benchmarks on these four weighting variables. We trimmed the smaller weights to a minimum value of 1.

We also calculated a survey weight for EVENS without the pseudo-design weights and only applying the calibration step, thus allowing for a comparison of the methods and an understanding on the variability of the survey weights. The summary results of the final weighting procedure are in Table 2.7. As expected, we obtained a large variation in the final survey weights largely due to the oversampling of small ethnic minority groups and the undersampling of large ethnic minority groups. In addition, the White British sample is small relative to their proportion of the population and therefore they have large survey weights.

Conclusion

EVENS represents methodological innovation primarily in the use of a non-probability survey design for a large national survey. Importantly, our experience with EVENS shows that this type of survey design can be particularly advantageous for recruiting minoritised and marginalised populations. By making the invitation to participate open to all, partnering with key race equality organisations for questionnaire design and recruitment, having a large number of ethnic minority groups represented, responsively adapting our fieldwork methods (particularly procedures for data collection, data monitoring and quality assurance) and implementing comprehensive post-fieldwork data adjustments to ensure a complete, robust dataset, we have shown how data generated with our innovative methods can be used as representative of ethnic minority people in Britain. As a successful example of a non-traditional, non-probability approach to social surveys, EVENS presents a challenge to data producers and data users to better represent ethnic minority populations. There are many lessons to be learnt from the EVENS methodology and we hope that the novel and important findings presented in the chapters of this book will encourage others in pursuing new approaches to collecting social science data.