WEIGHTING OF A WEB PANEL SURVEY CARRIED OUT IN THE PANDEMIC SCENARIO

Marcelo Trindade Pitta
Pedro Luis do Nascimento Silva

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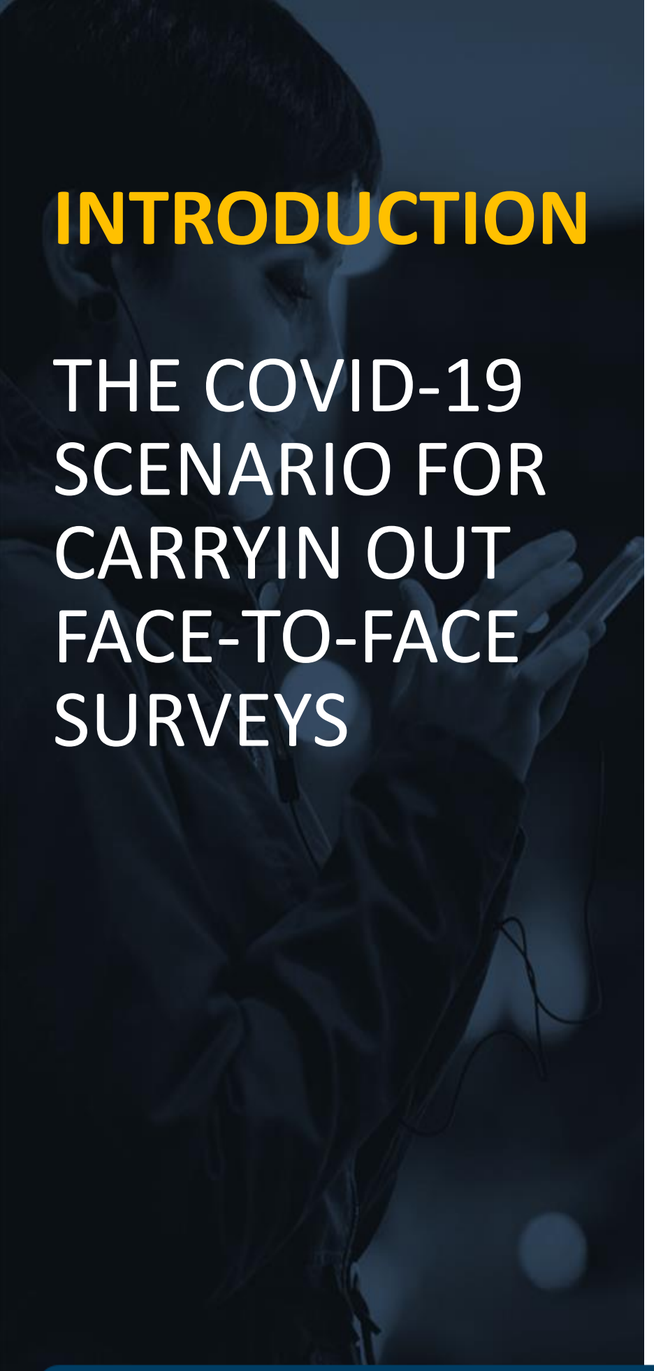


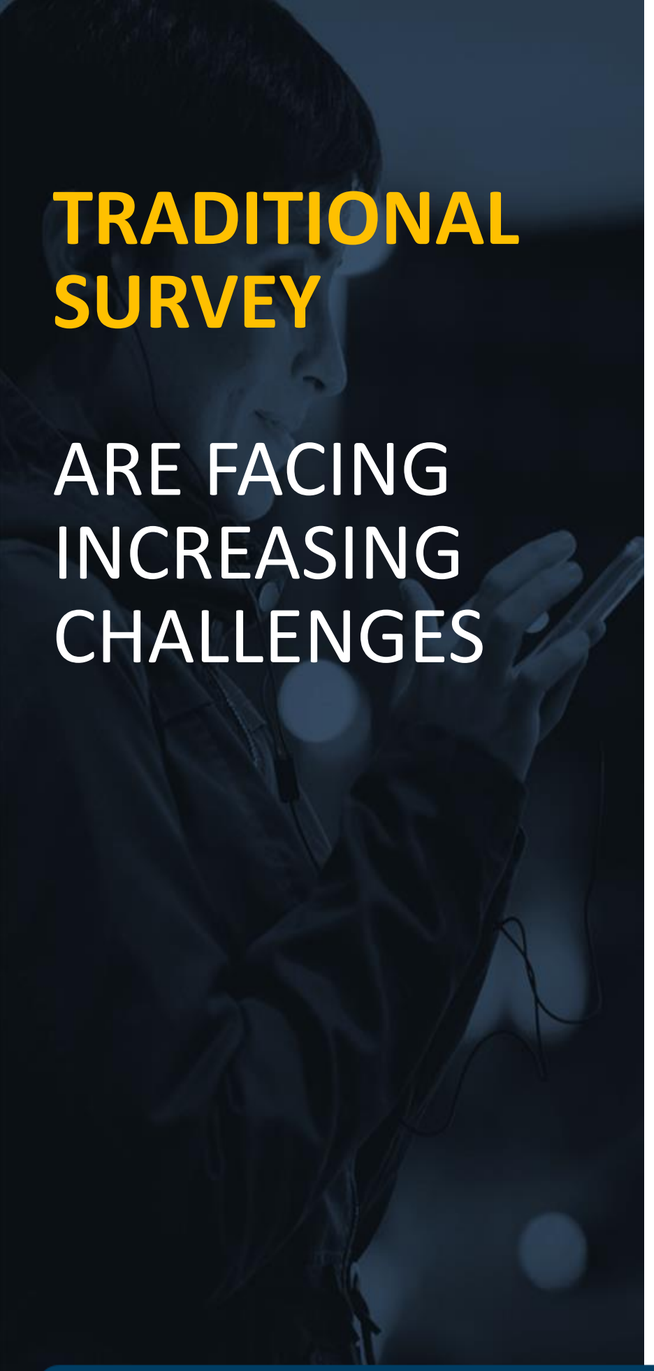
INTRODUCTION

THE COVID-19 SCENARIO FOR CARRYIN OUT FACE-TO-FACE SURVEYS

The COVID-19 pandemic made the traditional face-to-face interviews impossible for most surveys.

Alternative data collection methods had to be developed for population and other surveys.

Incomplete or partial frames have emerged as a critical barrier.



TRADITIONAL SURVEY

ARE FACING INCREASING CHALLENGES

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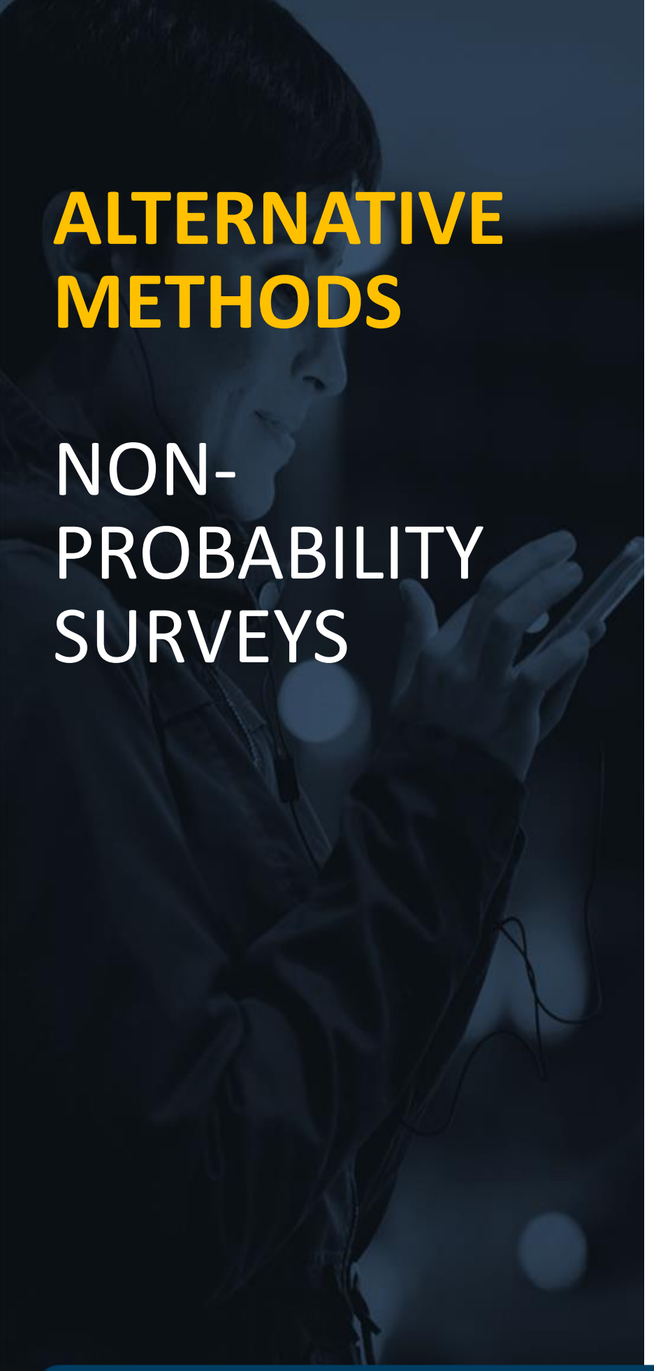
Traditional surveys for public/official statistics:

- Rely on probability sampling from complete frames;
- Methods of data collection: CAPI, CATI and/or CAWI;
- Increasing non-response rates; and
- Increasing demand for more timely and disaggregated data.

While dealing with decreasing resources.

On the other hand….



ALTERNATIVE METHODS

NON-PROBABILITY SURVEYS

Non-probability surveys:

- Cheaper to collect;
- Larger samples can be collected in less time;
- May introduce some types of bias.

Approach to overcome the difficulties:

- Probability sample survey as a reference to weight the non-probability sample;
- Mitigate the bias of estimates: model-dependent which adds complexity to the survey estimation.

COLLECTING DATA FROM A WEB PANEL

NON-PROBABILITY SAMPLE

ICT COVID-19 Web Panel Survey

Target population: Internet users aged 16+ in Brazil.

Domains: sex (2), level of education (3), region (5), age group (5) and socioeconomic status - SES (4).

Frame:

- Web panel of individuals maintained by market research companies.
- Telephone lists to reach a broader population (least favored social classes and less educated).

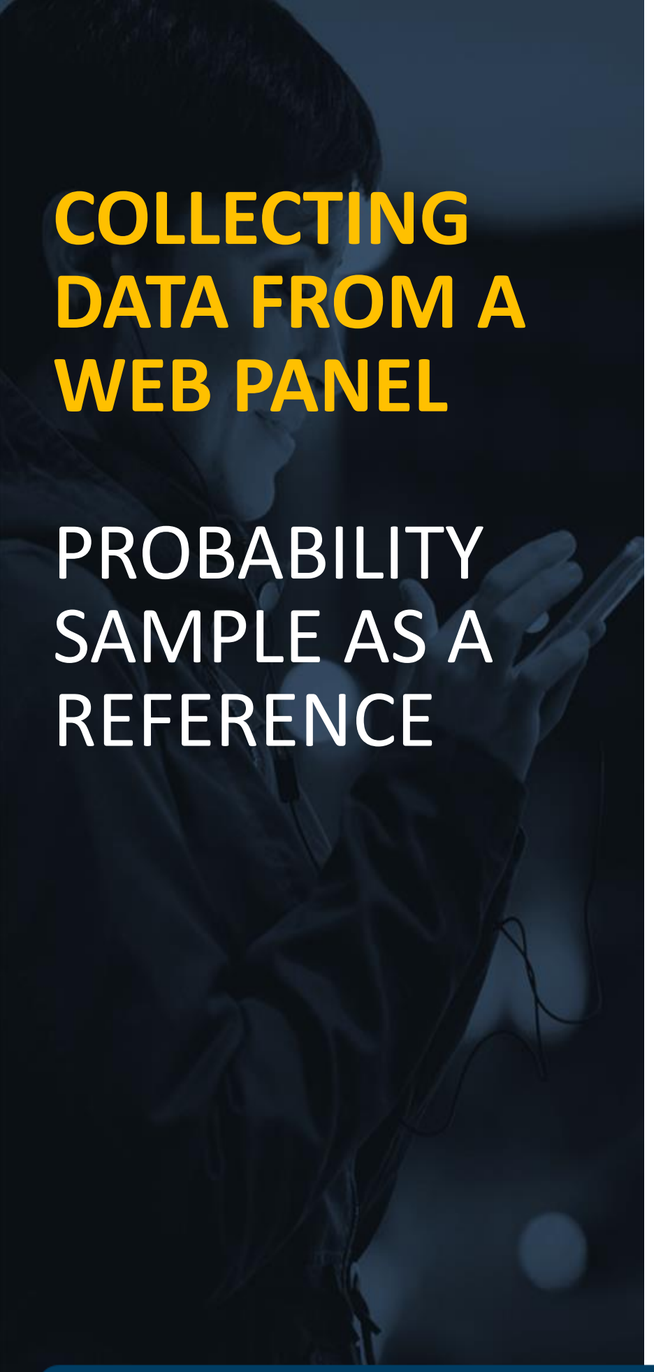
COLLECTING DATA FROM A WEB PANEL

NON-PROBABILITY SAMPLE

ICT COVID-19 Web Panel Survey

› **Sample design**: quota sample established based on the following variables: sex, region, socioeconomic status (SES), age group and level of education.

Mode	Contacts tried	Respondents
Web	18,734	2,539
Telephone	72,794	88
Total	91,528	2,627

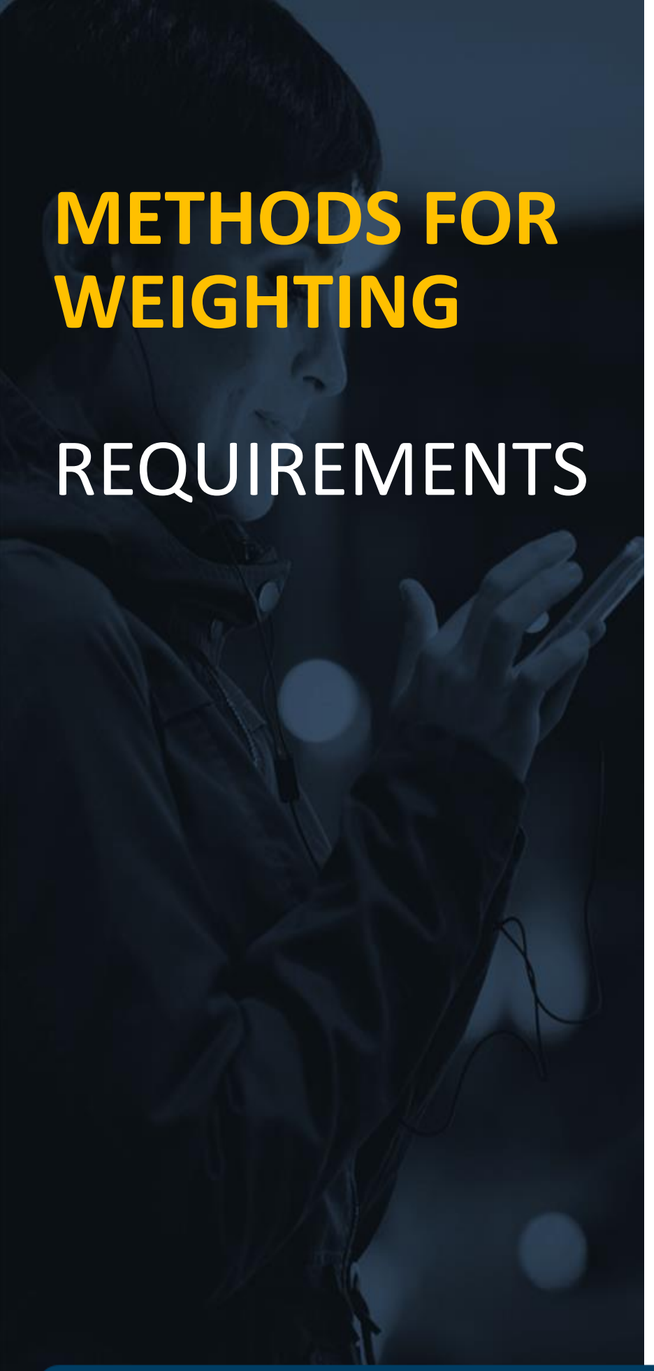


COLLECTING DATA FROM A WEB PANEL

PROBABILITY SAMPLE AS A REFERENCE

ICT Households Survey 2019: Reference survey

- **Target population**: Brazilian households and all individuals 10+ years old residing in permanent private Brazilian households.
- **Frame**: IBGE 2010 census tracts database.
- **Total sample size**: some 30,000 interviews (households and individuals).
- **Sample design**: stratified multi-stage sampling of households and residents.



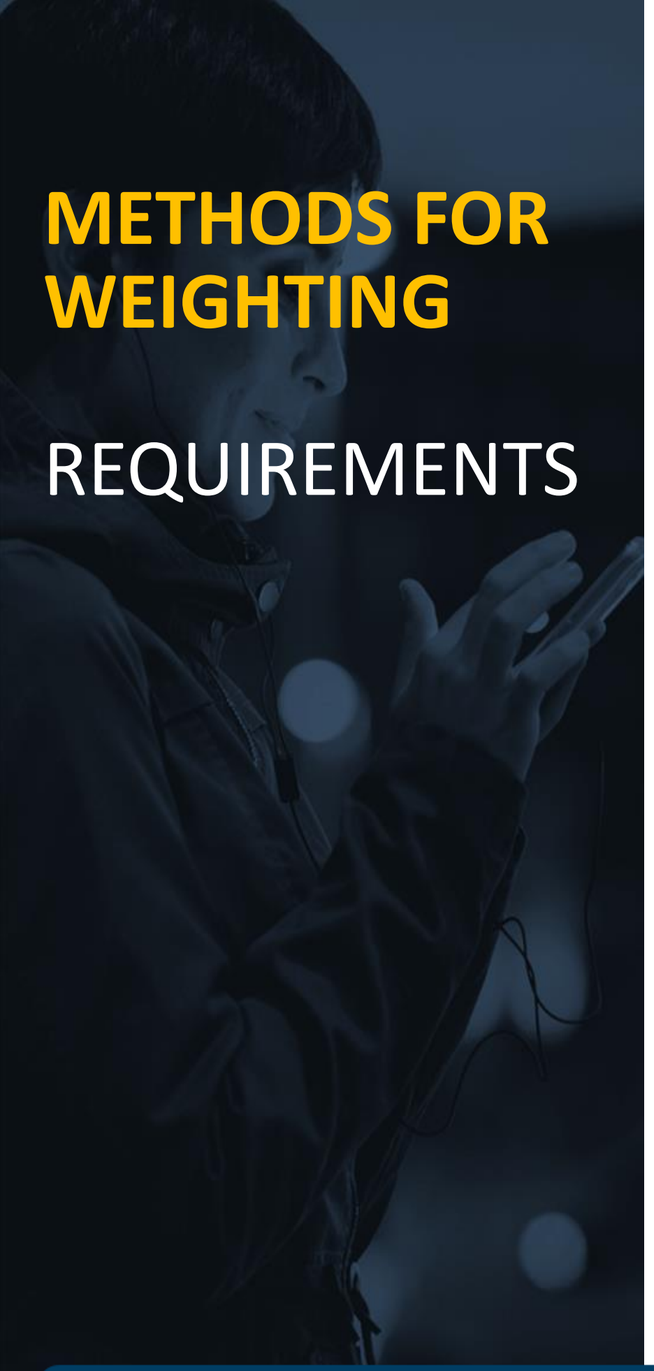
METHODS FOR WEIGHTING

REQUIREMENTS

Common support

Using the probability sample to weight the web panel survey requires the two samples to:

- Be carried out for the same reference period;
- Collect a range of variables in the same way (overlapping questions);
- Address the same target population;
- Have no intersection of respondents.



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? › Have no intersection of respondents.

The probability sample must represent the whole target population, being adjusted for non-response and expanding to known population totals (Valliant 2019).

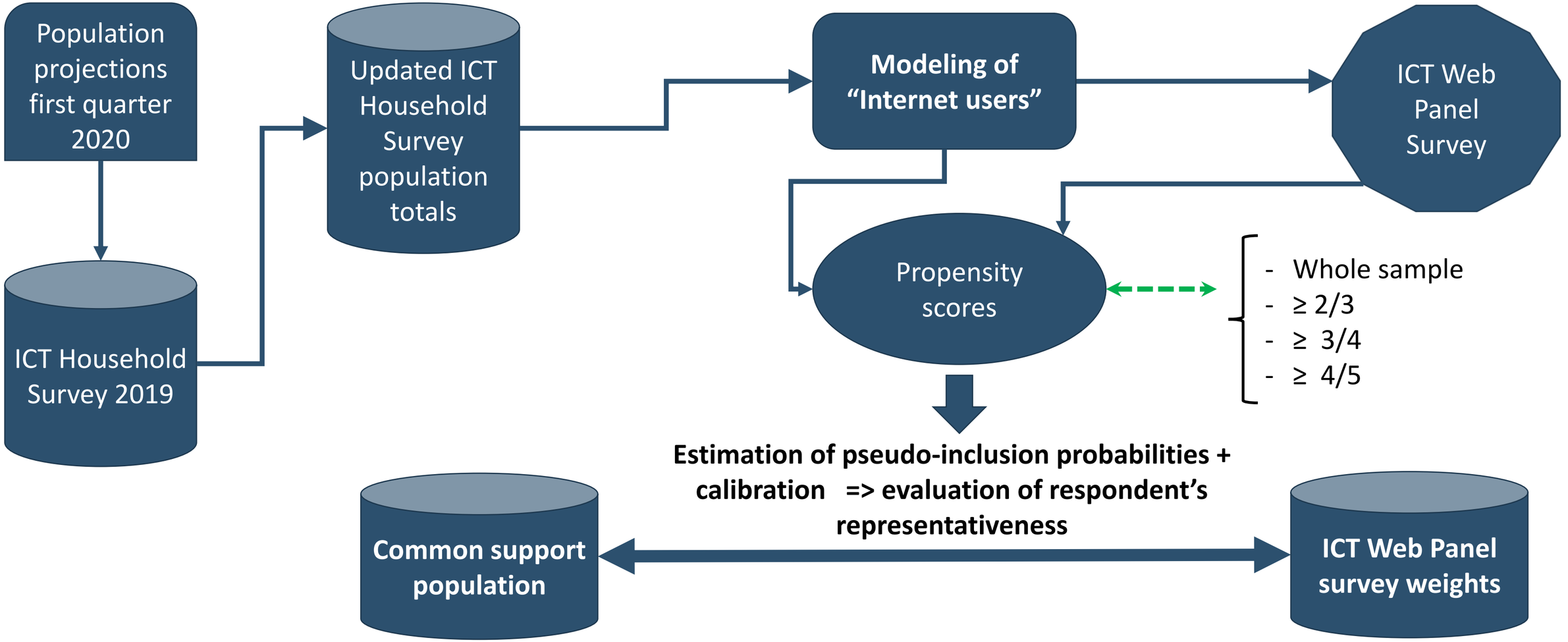
METHODS

APPROACH USED

- Estimate the size of the target population – Internet users 16+ years old – using data collected by 2019 ICT Households Survey.
- Estimate pseudo-inclusion probabilities for the non-probability sample units via logistic regression model and use their reciprocals as weights.
- Evaluate and identify the population represented by respondents of the web panel survey, among those in the target population.
- Estimate variance using bootstrap.

METHODS

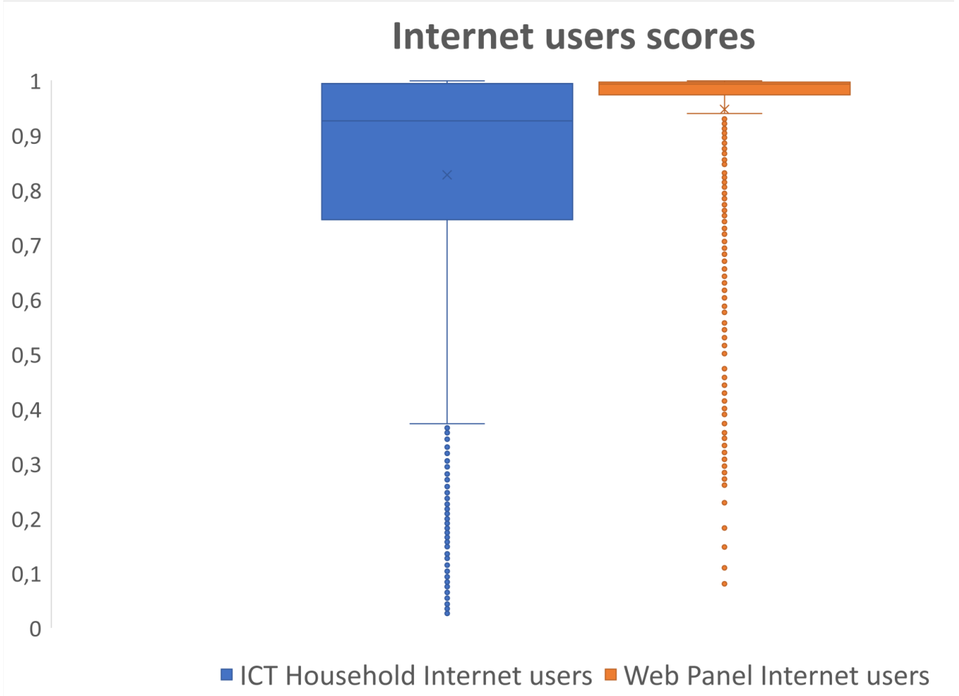
APPROACH USED



RESULTS

ICT COVID-19 WEB PANEL

- Internet users model statistics: R^2 = 0.431; Correctly classified individuals = 83%.
- Comparison of scores between ICT Household Survey and Panel Survey.



RESULTS

ICT COVID-19 WEB PANEL

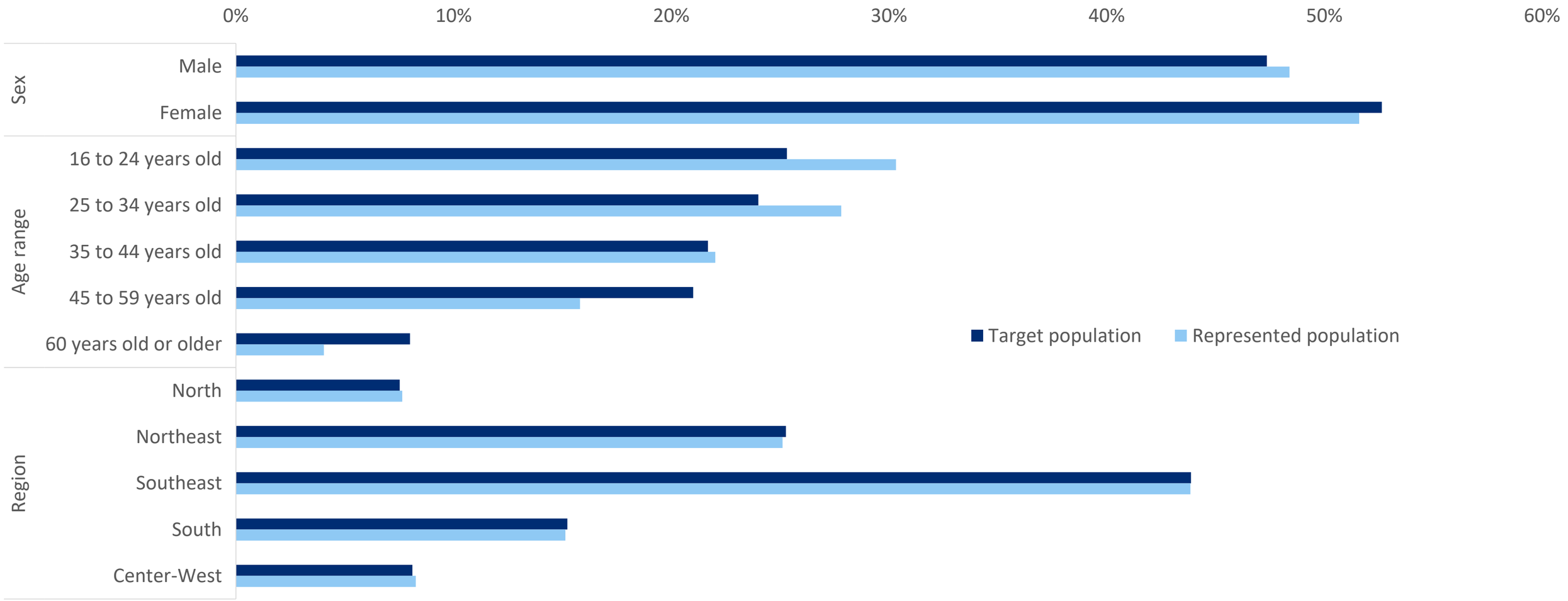
› Estimation and evaluation of pseudo-inclusion probabilities representativeness

Probability sample population used for calibration

Web Panel weight calibration factor statistics	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
Whole panel sample	0.120	0.283	0.369	0.581	0.630	5.840
Sample of Internet users with scores from 2/3 and up	0.078	0.484	0.637	0.988	1.038	12.518
Sample of Internet users with scores from 3/4 and up	0.063	0.623	0.767	0.918	0.930	4.380
Sample of Internet users with scores from 4/5 and up	0.087	0.447	0.554	0.729	0.791	5.604

RESULTS: Represented population (101M) and target population (121M)

ICT COVID-19 WEB PANEL



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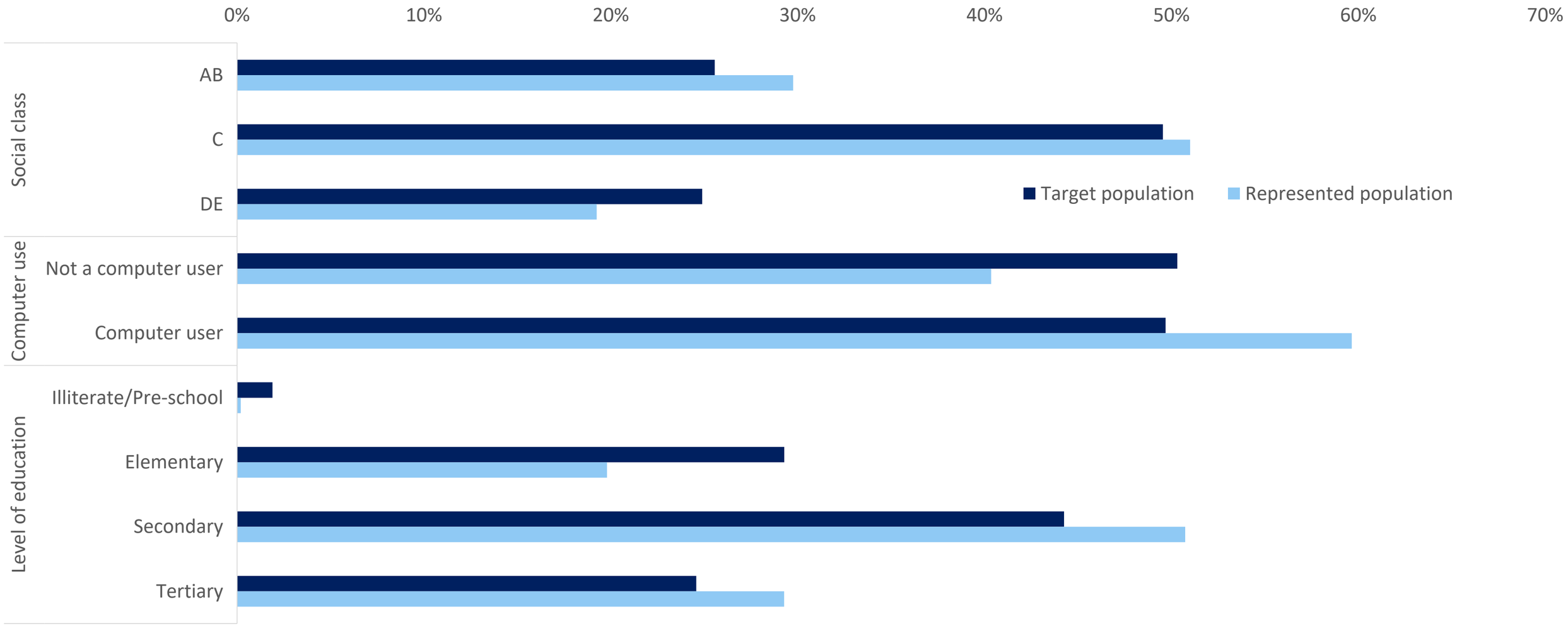

RESULTS: EVALUATING PROS & CONS

ICT COVID-19 WEB PANEL

Advantages

- Data were collected avoiding face-to-face interviews.
- The whole survey, from planning to data release, took less than two months to complete.
- Cost of data collection much cheaper than for a traditional face-to-face survey.

Disadvantages

- Web panel frame recruitment is not meant to address a specific population.
- Coverage issues remain, despite using a probability sample as reference.
- Approach is model-dependent – good models may not always be available.
- Explanation of methodology and its dissemination is complex.

CONCLUSIONS

ICT COVID-19 WEB PANEL

- Use of non-probability sampling for surveys is increasing.
- Use of reference probability sample survey to weight the non-probability sample is attempt to produce more reliable estimates.
- Probability sample surveys will continue to be needed, if they are to serve as reference samples for weighting more frequent non-probability surveys.
- Approaches to weight the non-probability samples are still being developed, much to be done.

Thank you all!

www.cetic.br
marcelopitta@nic.br
pedronsilva@gmail.com

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References

› Baker, R., Brick, J. M., Bates, N. A., Battaglia, M., Couper, M. P., Dever, J. A., Gile, K. J. and Tourangeau, R. 2013. *Summary Report of the AAPOR Task Force on Non-Probability Sampling*. Journal of Survey Statistics and Methodology 1 (2): 90–105. https://doi.org/10.1093/jssam/smt008.

› Coelho, I. B., Pitta, M. T. and Silva, P. L. d. N. 2020. *Estimating State Level Indicators from ICT Household Surveys in Brazil*. Statistical Journal of the IAOS 36 (2): 495–508. https://doi.org/10.3233/SJI-190511.

› Dever, J. A. 2018. *Combining Probability and Nonprobability Samples to Form Efficient Hybrid Estimates: An Evaluation of the Common Support Assumption*. In 2018 Federal Committee on Statistical Methodology (FCSM) Research Conference, 15.

› Elliott, M. R. 2009. *Combining Data from Probability and Non-Probability Samples Using Pseudo-Weights*. Survey Practice 2 (6): 1–7. https://doi.org/10.29115/sp-2009-0025.

References

› Elliott, M. R., and Valliant, R.2017. *Inference for Nonprobability Samples*. Statistical Science 32 (2): 249–64. https://doi.org/10.1214/16-STS598.

› ITU, International Telecommunication Union. 2014. *Manual for Measuring ICT Access and Use by Households and Individuals*. https://www.itu.int/dms_pub/itu-d/opb/ind/D-IND-ITCMEAS-2014-PDF-E.pdf.

› Little, R. J. A., and Rubin, D. B. 2002. *Statistical Analysis with Missing Data*. Wiley Series in Probability and Statistics.

› Valliant, R. 2019. *Comparing Alternatives for Estimation from Nonprobability Samples*. Journal of Survey Statistics and Methodology, https://doi.org/10.1093/jssam/smz003.

› Valliant, R., and Dever, J. A. 2011. *Estimating Propensity Adjustments for Volunteer Web Surveys*. Sociological Methods and Research. Vol. 40. https://doi.org/10.1177/0049124110392533.