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Comparing Probability-Based and Nonprobability Web Panels to Traditional Probability-Based Surveys: Analyzing Bias in Survey Estimates – *Virtual Presentation*

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Background

- **Traditional probability-based surveys (TPS)** are considered the "gold standard," relying on large-scale, high-quality face-to-face, mail, and telephone surveys with high response rates
- We used traditional or mixed-mode surveys from Slovenia's **Statistical Office**, **National Institute of Public Health**, and the **European Social Survey**
- **Probability-based web panels (PWP)** are gaining traction despite lower response rates. In Slovenia, we used the 1KA PWP panel with 3,221 members
- **Nonprobability web panels (NWP)** are widely used for business and public opinion polls. They may be appropriate in specific cases when they meet a fit-for-purpose criterion. We used Slovenia's largest NWP, Valicon

Probability Web Panel (1KA PWP)

- The **1KA PWP**, established in 2022, has 3,221 panelists
- **Push-to-web** recruitment method combining **fresh recruitment** from the population register and **piggybacking** on two TPS
 - Recruitment survey incentives: conditional **€10 gift card**
 - Wave incentives: unconditional **€5 gift cards**
- Overall response rates: **35%** (recruitment), **17%** (wave 1), **16%** (last wave)
- Estimates from **six waves** were included in the analysis
 - Wave 0: Health and education (December 2022)
 - Wave 1: Living conditions (February 2023)
 - Wave 2: Travel habits, ICT, and risky behaviors (April 2023)
 - Wave 3: Social issues in Slovenia (May 2023)
 - Wave 4: Work, mental health, safe Internet use (June 2023)
 - Wave 5: Internet use and current social issues (June 2024)

Comparing TPS, PWP, and NWP: Methods

- **Relative Bias (RB)** is our key evaluation criterion, usually expressed as a share or percentage. We will always consider its absolute value

$$RB = \text{Bias}(\bar{y})/\bar{Y},$$

$$\text{where } \text{Bias}(\bar{y}) = E(\bar{y}) - \bar{Y}$$

- Approximately **2,600 variables** (weighted estimates) were compared across:
 - **TPS, PWP, and NWP** (segment A: **14 surveys**); TPS is the assumed benchmark
 - **PWP and NWP** (segment B: **17 surveys**); PWP is the assumed benchmark
- Due to the large number of variables, we used the percentages of variables with an **RB above 10%** as a standardized measure of bias in the estimates

Surveys Used for Benchmark Estimates

# (Seg.)	Survey Name	Initial Provider	Var. Count
1 (A)	Work and Living Conditions	Statistical Office	58
2 (A)	Survey on Tourist Trips of the Domestic Population (households)	Statistical Office	16
3 (A)	Survey on Tourist Trips of the Domestic Population	Statistical Office	24
4 (A)	ICT Use in Households and by Individuals (e-education, 2023)	Statistical Office	39
5 (A)	ICT Use in Households and by Individuals (2024)	Statistical Office	168
6 (A)	European Social Survey ("Core" – Slovenian Public Opinion 2023/1)	ESS	392
7 (A)	Active and Inactive Population	Statistical Office	17
8 (A)	Living Conditions Survey (persons)	Statistical Office	57
9 (A)	Living Conditions Survey (households)	Statistical Office	54
10 (A)	Consumer Opinion	Statistical Office	8
11 (A)	Less Salt (monitoring excreted sodium, potassium and iodine)	Public Health Institute	26
12 (A)	National Survey on Tobacco, Alcohol and Other Drugs	Public Health Institute	141
13 (A)	National Survey on Attitudes Towards Mental Health	Public Health Institute	68
14 (A)	Adult Learning and Education	Statistical Office	143
15 (B)	Privacy (CRONOS-2, European Social Survey)	ESS	103
16 (B)	Safe Internet Hotline (spletno-oko.si)	1KA panel	77
17 (B)	The Safe Internet Use Awareness Point (safe.si)	1KA panel	127
18–31 (B)	Survey on Internet Use and Current Social Issues (wave 5, 14 sets)	1KA panel	1,158

Relative Bias Overview (Segment A)

Survey	<u>PWP</u> vs. TPS		<u>NWP</u> vs. PWP	
	RB > 10%	Var. Count	RB > 10%	Var. Count
Work and Living Conditions	14%	58	4%	53
Tourist Trips of the Domestic Pop. (HH)	44%	16	19%	16
Tourist Trips of the Domestic Pop.	8%	24	42%	24
ICT Use (education, 2023)	69%	39	13%	39
ICT Use (2024)	25%	168	17%	160
ESS "Core" (SI Public Opinion 2023/1)	27%	392	11%	390
Active and Inactive Population	53%	17	0%	17
Living Conditions Survey	61%	57	47%	57
Living Conditions Survey (HH)	57%	54	43%	54
Consumer Opinion	0%	8	---	---
Less Salt	38%	26	---	---
Tobacco, Alcohol and Other Drugs	21%	141	10%	139
Attitudes Towards Mental Health	21%	68	6%	68
Adult Learning and Education	23%	143	---	---
	M 33% (Mdn 26%)	1,211	M 19% (Mdn 13%)	1,017

Relative Bias Overview (Segment B)

Survey	NWP vs. PWP	
	RB > 10%	Var. Count
Safe Internet Hotline (spletno-oko.si)	17%	77
The Safe Internet Use Awareness Point (safe.si)	2%	127
Privacy (CRONOS-2, European Social Survey)	23%	103
1KA panel topics (wave 5)		
Demographics	26%	152
Online Disinformation	0%	20
Digital Certificate	14%	51
E-voting	8%	117
Hobbies and Interests	0%	8
ICT (not Statistical Office)	30%	346
Providing Assistance to the Elderly	50%	8
Politics	20%	10
Various Social Aspects	26%	31
Neighbourhood	12%	34
Hate Speech	11%	149
Artificial Intelligence	5%	166
Elections and Referendums	39%	49
Health	6%	17
	M 17% (Mdn 14%)	1,465

General Content Tendency (I)

In the direction of **TPS → PWP → NWP**, respondents are consistently:

- Increasingly **less happy and satisfied** with life, with declining trust in people
- Increasingly **dissatisfied** with the **economic situation**, facing greater material and social deprivation
- Becoming more **politically active** and leaning further to the **left**
- Decreasingly religious
- Traveling more frequently
- **Fewer** have **fixed-term employment** contracts
- More often living in **multi-apartment buildings**

General Content Tendency (II)

In the direction of **TPS → PWP → NWP**, respondents are consistently:

- Increasingly experiencing **long-term health issues**
- Increasingly **dissatisfied** with the Slovenian **education** and **healthcare** systems
- Becoming **less supportive** of the **EU and migration**; also, fewer are immigrants themselves
- Increasingly belonging to groups suffering from **inequality**
- Declining in union membership
- Feeling less responsible for climate change

Concluding Remarks

- Differences in estimates between TPS and PWP were **surprisingly high** (mean 33% of variables with $RB > 0.10$)
- Differences between TPS and PWP were **surprisingly larger** than those between PWP and NWP (mean 33% vs. 19% with $RB > 0.10$)
- Differences vary notably by subject area
- The cost-benefit advantage of panels (larger sample sizes) rarely offsets the higher bias compared to more expensive **official** TPS
- Attitudinal topics perform better in panels than behavioral or factual variables

Limitations

- Both panels **lack an offline mode**, putting them at a disadvantage
- **Weighting both panels to the entire population** further disadvantaged them; comparing only the internet population would prove more advantageous for RB
- **RB > 10%** may be a very **arbitrary benchmark**
- RB alone is too restrictive for operational use, as methodological decisions also depend on **time, cost, and research goals**
- Many **variables** are **specific** to the Statistical Office and the Institute of Health, reflecting common constructs used in social science surveys

Thank You

For more information

1KA Panel

<https://panel.1ka.si>

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