

# The HLS<sub>19</sub>-VAC Instrument to measure Vaccination Literacy

(scoring based on dichotomized items)  
updated version July 2023

## Development of the Instrument

The HLS<sub>19</sub>-VAC instrument is a 4-item questionnaire to measure vaccination literacy in general adult populations and is part of the HLS<sub>19</sub> family of instruments on measuring health literacy (HL).

It was developed by a working group of the HLS<sub>19</sub> (Health Literacy Population Survey 2019–2021) Consortium of 17 countries. HLS<sub>19</sub> is the first project of the WHO Action Network on Measuring Population and Organizational Health Literacy (M-POHL; <https://m-pohl.net>), coordinated by the HLS<sub>19</sub> International Coordination Centre (ICC).

The HLS<sub>19</sub>-VAC was applied in 11 countries (Austria, Belgium, Bulgaria, Czech Republic, Germany, Hungary, Ireland, Italy, Norway, Portugal, Slovenia) in large samples using different data collection methods.

**Underlying definition of vaccination literacy:** The definition of vaccination HL is based on the integrative definition of comprehensive, general HL by the HLS-EU Consortium (Sørensen et al. 2012): vaccination HL refers to individuals' knowledge, motivation, and skills to find, understand, evaluate and apply immunisation-related information in order to make adequate immunization decisions (cf. The HLS<sub>19</sub> Consortium of the WHO Action Network M-POHL 2021: Chapter 13).

**Underlying concept of operationalization:** The HLS<sub>19</sub>-VAC instrument operationalises four aspects of vaccination-related information management (to access/obtain, understand, appraise/judge/evaluate, and apply/use information on immunisation) with one indicator for each aspect (cf. The HLS<sub>19</sub> Consortium of the WHO Action Network M-POHL 2021): Chapter 13). The items of the HLS<sub>19</sub>-VAC instrument are a subset of the HLS<sub>19</sub>-Q47 instrument, which is a revised version of the HLS-EU-Q47 questionnaire (Sørensen et al. 2013). Indicators were rated by a four-point Likert scale concerning the experienced difficulty of each task. As such, the HLS<sub>19</sub>-VAC is a 'subjective' perception-based instrument.

**Developed and validated for** measuring vaccination HL in general adult national resident populations aged 18+.

**Available languages:** Bulgarian, Czech, Dutch, English, German, Hungarian, Italian, Norwegian, Portuguese, and Slovenian.

# Description of the instrument

## Introductory<sup>1</sup> and items in the English (original) version

"It is not always easy to get understandable, reliable, and useful information on health-related topics. With the following questions we would like to find out which tasks related to handling health information are more or less easy or difficult. On a scale from very easy to very difficult, how easy would you say it is ...

1. ... to find information on recommended vaccinations for you or your family? (q19 of HLS<sub>19</sub>-Q47)
2. ... to understand why you or your family may need vaccinations? (q22 of HLS<sub>19</sub>-Q47)
3. ... to judge which vaccinations you or your family may need? (q26 of HLS<sub>19</sub>-Q47)
4. ... to decide if you should have a flu vaccination? (q29 of HLS<sub>19</sub>-Q47)

**Response categories:** 4 "Very easy", 3 "Easy", 2 "Difficult", 1 "Very difficult", 999 "DK / Refusal (SPONTANEOUS)"

**Calculation of the score:** The HLS<sub>19</sub>-VAC score is calculated as the percentage (ranging from 0 to 100) of items answered as "very easy" or "easy" and can take the values 0, 25, 50, 75 and 100. Meaningful vaccination HL scores can only be estimated for respondents with a complete dataset on the four vaccination HL items:

$$\frac{\text{Number of "easy" or "very easy" responses}}{4} \times 100$$

If not all four items contain valid responses, the score is set to "missing". A higher score reflects a higher level of vaccination literacy.

**Interpretation of the score:** The HLS<sub>19</sub>-VAC score is context-dependent, as the difficulty of the items reflects the interaction of personal abilities and contextual factors related to the country's health system.

## Psychometric Properties

In the following, the main characteristics of the HLS<sub>19</sub>-VAC score in 11 country-specific samples (general adult populations, i.e., persons aged 18 and over) are summarized. Further below, the Cronbach's alpha coefficients and the results of confirmatory factor analyses, Partial Credit Models and Rasch analyses are shown.

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<sup>1</sup> This wording was used in personal interviews (CAPI/PAPI) and online surveys (CAWI). In telephone interviews (CATI), the question was: "On a scale from very easy, easy, difficult, and very difficult, how easy would you say it is ..."  
June 2022, updated in July 2023

Table 1:

Main characteristics of the national surveys that collected vaccination HL as part of HLS<sub>19</sub>

Country	Languages	Type of data collection	Sampling procedure	Period of data collection	Valid responses
Austria	German	CATI	Multi-stage random sampling	16.03.2020–26.05.2020	2,967
Belgium	Dutch, French	CAWI	Quota sampling	30.01.2020–28.02.2020 and 01.10.2020–26.10.2020	1,000
Bulgaria	Bulgarian	CAPI, CAWI	Proportional stratified sampling and random quota sampling and	15.08.2020–30.11.2020 and 01.04.2021–01.06.2021	865
Czech Republic	Czech	CATI, CAWI	Random digital procedure and random quota sampling	10.11.2020–24.11.2020	1,599
Germany	German	PAPI	Multi-stage random and quota sampling	13.12.2019–27.01.2020	2,143
Hungary	Hungarian	CATI	Multi-stage random sampling	02.12.2020–20.12.2020	1,195
Ireland	English	CATI	Random digit dialing approach	24.07.2020–07.12.2020	4,487
Italy	Italian	CATI, CAWI	Proportional stratified sampling	08.04.2021–08.05.2021	3,500
Norway	Norwegian	CATI	Random sampling procedure within each stratum	04.04.2020–13.05.2020	2,855
Portugal	Portuguese	CATI	Random stratified sampling	10.12.2020–13.01.2021	1,247
Slovenia	Slovenian	CAPI, paper-and-pencil*, CAWI	Multi-stage random sampling	09.03.2020–15.03.2020 and 09.06.2020–10.08.2020	3,360

CATI Computer-assisted telephone interview  
CAWI Computer-assisted web-based interview  
CAPI Computer-assisted personal interview  
PAPI Paper-assisted personal interview

\*Paper-and-pencil was used only in 12 interviews in Slovenia

Source: HLS<sub>19</sub> Consortium

**Cronbach's alpha:** The Cronbach's alpha coefficients, calculated for the dichotomised items, range from 0.60 (Portugal) to 0.85 (Belgium) with a mean of 0.72 (Table 2). For details, please see Chapter 13.2.2 in The HLS<sub>19</sub> Consortium of the WHO Action Network M-POHL (2021).

**Single-Factor Confirmatory Factor Models by country [CFA]:** The Standardized Root Mean Square Residual [SRMSR], the Root Mean Square Error of Approximation [RMSEA], the Comparative Fit Index [CFI], the Tucker-Lewis Index [TLI], the Goodness of Fit Index [GFI], and the Adjusted Goodness of Fit Index [AGFI] indicate a good model-data fit for all of the 11 surveys for the dichotomised items (Table 2). For details, please see Chapter 13.2.2 in The HLS<sub>19</sub> Consortium of the WHO Action Network M-POHL (2021).

Table 2:

## Cronbach's alpha and Single-Factor Confirmatory Factor Analysis

Country	Cronbach's alpha	Single-Factor Confirmatory Factor Analysis		
		SRMSR	RMSEA	CFI
Austria	0.75	0.02	0.03	1.00
Belgium	0.85	0.01	0.00	1.00
Bulgaria	0.70	0.05	0.08	0.99
Czech Republic	0.75	0.03	0.04	1.00
Germany	0.71	0.01	0.00	1.00
Hungary	0.71	0.01	0.00	1.00
Ireland	0.68	0.04	0.06	0.99
Italy	0.75	0.01	0.00	1.00
Norway	0.67	0.02	0.01	1.00
Portugal	0.60	0.03	0.00	1.00
Slovenia	0.73	0.02	0.03	1.00

CFI=Comparative Fit Index; RMSEA=Root Mean Square Error of Approximation; SRMSR=Standardized Root Mean Square Residual  
NOTE: These values are based on the 4 dichotomized HLS<sub>19</sub>-VAC items (very easy + easy vs. difficult + very difficult).

Source: HLS<sub>19</sub> Consortium

**Rasch Partial Credit Model (PCM):** The results of fitting the PCM model in each country-specific sample is based on the four polytomous HLS<sub>19</sub>-VAC items (with four response categories very easy, easy, difficult, very difficult). When testing data up against the PCM for each country, the HLS<sub>19</sub>-VAC displays sufficient overall data-model fit in Czech Republic, Germany, Hungary, Ireland, and Italy, and acceptable overall data-model fit in Austria, Belgium, Norway, and Slovenia. Data collected in Bulgaria and Portugal show rather poor overall data-model fit. Each of the four HLS<sub>19</sub>-VAC items displayed ordered response categories, and no "significant" response dependency between items were observed. The HLS<sub>19</sub>-VAC items display differential item functioning (DIF) for country/language, which means that the HLS<sub>19</sub>-VAC scale does not measure invariantly across countries. The HLS<sub>19</sub>-VAC items also display DIF for various person factors, such as age and gender, but there is no consistent pattern between countries.

The HLS<sub>19</sub>-VAC is sufficiently unidimensional and measures a single latent trait or factor. For details, please see Chapter 13.2.2 in The HLS<sub>19</sub> Consortium of the WHO Action Network M-POHL (2021).

**Distribution of HLS<sub>19</sub>-VAC score:** The 4 vaccination-related HL tasks mentioned above (finding information on vaccinations, understanding why one needs to get vaccinated, judging which vaccinations one need, and deciding to get vaccinated using flu vaccination as an example), were perceived as manageable by most respondents and resulted in skewed score distributions in the 11 country-specific HLS<sub>19</sub> samples.

## Validity

**Content and face validity** are ensured by using the theory-based definition of vaccination HL for selecting and operationalizing the included indicators.

**Discriminant validity:** Country-wise Rasch analysis indicates that the combination of the HLS<sub>19</sub>-VAC scale and the HLS<sub>19</sub>-Q12 scale (for General HL) yields a two-dimensional scale, which indicates that the HLS<sub>19</sub>-VAC scale and the HLS<sub>19</sub>-Q12 scale measure different latent traits. These results from Rasch-modelling were strengthened by country-specific confirmatory factor analyses comparing a two-factor model based on the HLS<sub>19</sub>-VAC items (factor 1) and the HLS<sub>19</sub>-Q12 items (factor 2) with a one-factor model including all 16 items. For details, please see Chapter 13.2.2 in The HLS<sub>19</sub> Consortium of the WHO Action Network M-POHL (2021).

**Concurrent predictive validity:** The HLS<sub>19</sub>-VAC score has a social gradient in all 11 samples. Additional data on “vaccination behaviour” were collected in 7 of the 11 countries, and an association between self-reported vaccination behaviour and VAC HL was observed in 5 countries – see sections 13.2.5 and 13.2.6 in The HLS<sub>19</sub> Consortium of the WHO Action Network M-POHL (2021) for details.

**Summarizing:** Using multi-stage random or quota sampling procedures, the HLS<sub>19</sub>-VAC has been validated for 4 modes of data collection (PAPI, CAPI, CATI, CAWI) and for multiple languages in large samples. The HLS<sub>19</sub>-VAC scale displays sufficient psychometric properties and validity for large-scale measurements.

## Use of the Instrument

**Procedure for obtaining the instrument:** The ownership of the HLS<sub>19</sub>-VAC rests with the HLS<sub>19</sub> Consortium, which developed the instrument. The HLS<sub>19</sub>-VAC can be used by third parties for research purposes free of charge but requires a contractual agreement between the user and the ICC of the HLS<sub>19</sub> Consortium. An application form for getting permission agreement is available at <https://m-pohl.net/tools>.

**Address any questions to:** The International Coordination Centre (ICC) of the HLS<sub>19</sub> Project, located at:

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The HLS<sub>19</sub>-VAC is part of a family of instruments also measuring different types of HL (please see <https://m-pohl.net/tools>):

- » HLS<sub>19</sub>-Q12, HLS<sub>19</sub>-Q16 and HLS<sub>19</sub>-Q47 to measure General Health Literacy
- » HLS<sub>19</sub>-COM-P-Q11 (long form) and HLS<sub>19</sub>-COM-P-Q6 (short form) to measure Communicative Health Literacy
- » HLS<sub>19</sub>-NAV to measure Navigational Health Literacy
- » HLS<sub>19</sub>-DIGI to measure Digital Health Literacy

This factsheet is also available **in French**.

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# References

Sørensen, K.; Van den Broucke, S.; Fullam, J.; Doyle, G.; Pelikan, J.; Slonska, Z.; Brand, H.; Consortium Health Literacy Project, European (2012): Health literacy and public health: a systematic review and integration of definitions and models. In: BMC Public Health 12/80

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The HLS<sub>19</sub> Consortium of the WHO Action Network M-POHL (2021): International Report on the Methodology, Results, and Recommendations of the European Health Literacy Population Survey 2019–2021 (HLS<sub>19</sub>) of M-POHL. Austrian National Public Health Institute, Vienna ([https://m-pohl.net/Int\\_Report\\_methodology\\_results\\_recommendations](https://m-pohl.net/Int_Report_methodology_results_recommendations))

A list of further publications relating to the instruments can be found at:

- » <https://m-pohl.net/Results>
- » [https://m-pohl.net/HLS\\_Project\\_Publications\\_Presentations](https://m-pohl.net/HLS_Project_Publications_Presentations)