



**Supplementary file**

© 2026 Ng'ambi W.F. et al.

**DOI:** [10.18332/pne/237373](https://doi.org/10.18332/pne/237373)

The content has been provided by the author(s) and has not been reviewed, verified, or endorsed by European Publishing. It may not have undergone peer review. The views, opinions, and recommendations expressed are solely those of the author(s) and do not necessarily reflect the position of European Publishing. European Publishing accepts no responsibility or liability for any consequences arising from the use of, or reliance on, this content.

## STROBE Checklist – Cross-Sectional Study

**Reporting guideline: STROBE (Strengthening the Reporting of Observational Studies in Epidemiology), cross-sectional study checklist.**

The recommendation wording below is a concise paraphrase; manuscript locations are mapped to the current revised draft.

| Item | Topic                    | STROBE reporting requirement (paraphrased)                                       | Where addressed in manuscript                                             |
|------|--------------------------|----------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| 1a   | Title/abstract           | Identify the cross-sectional/secondary-analysis design in the title or abstract. | Title; Abstract, Methods.                                                 |
| 1b   | Title/abstract           | Give a balanced summary of methods and main findings.                            | Abstract, Methods/Results/Conclusion.                                     |
| 2    | Background               | Explain scientific background and rationale.                                     | Introduction, paragraphs 1–4.                                             |
| 3    | Objectives               | State specific study objectives/hypotheses.                                      | Introduction, final paragraph (four aims).                                |
| 4    | Study design             | Present key design elements early.                                               | Methods: Study design and data source.                                    |
| 5    | Setting                  | Describe locations, survey period, and data-collection context.                  | Methods: Study design and data source; 2012–2023, five WHO regions.       |
| 6    | Participants             | Describe eligibility, source population, and selection.                          | Methods: smoking-status definition; Results: Sample derivation; Figure 1. |
| 7    | Variables                | Define outcome, predictors, confounders, and effect modifiers.                   | Methods: Study variables and operational definitions; Box 1.              |
| 8    | Data sources/measurement | Describe data sources and measurement/assessment for each variable.              | Methods: Study design/data source; Study variables; Statistical analysis. |
| 9    | Bias                     | Describe steps taken to address potential bias.                                  | Methods: pre-2012 data-quality limitation; survey                         |

| Item | Topic                      | STROBE reporting requirement (paraphrased)              | Where addressed in manuscript                                                                                         |
|------|----------------------------|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
|      |                            |                                                         | design/weighting; Discussion: Strengths and limitations.                                                              |
| 10   | Study size                 | Explain how the analytic sample size was obtained.      | Results: Sample derivation; Figure 1 (455,341 → 54,460 → 18,740 → 17,332).                                            |
| 11   | Quantitative variables     | Explain treatment/grouping of quantitative variables.   | Methods: age groups; AUDIT-C thresholds; MET-minutes; survey year scaled per decade.                                  |
| 12a  | Statistical methods        | Describe statistical methods and confounder adjustment. | Methods: Statistical analysis; survey-weighted logistic regression.                                                   |
| 12b  | Subgroups/interactions     | Describe subgroup or interaction analyses.              | Methods: region-specific models; Africa-specific policy model; within-region interpretation.                          |
| 12c  | Missing data               | Explain handling of missing data.                       | Methods: exclusion for missing PSU/stratum/weight; Results/Table 1 notes on available-case and complete-case samples. |
| 12d  | Sampling strategy          | Describe methods accounting for complex sampling.       | Methods: PSU, stratum, wstep1, composite identifiers, design df, linearized variance.                                 |
| 12e  | Sensitivity/other analyses | Describe sensitivity or robustness analyses.            | Methods/Results: illustrative temporal extrapolations and regression diagnostics; Supplementary Tables S4–S5.         |
| 13a  | Participant flow           | Report numbers at each stage.                           | Results: Sample derivation; Figure 1.                                                                                 |
| 13b  | Reasons for exclusions     | Give reasons for non-participation/exclusion at stages. | Figure 1 and sample-derivation narrative: never smokers/years, incomplete                                             |

| Item | Topic                     | STROBE reporting requirement (paraphrased)                             | Where addressed in manuscript                                                                                                                        |
|------|---------------------------|------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
|      |                           |                                                                        | covariates, missing design variables.                                                                                                                |
| 13c  | Flow diagram              | Use a flow diagram where helpful.                                      | Figure 1.                                                                                                                                            |
| 14a  | Descriptive data          | Report participant characteristics and relevant exposures/confounders. | Table 1; Results: Sample characteristics.                                                                                                            |
| 14b  | Missing data              | Report numbers with missing data for variables of interest.            | Table 1 notes and available-case denominators; Figure 1 for core-covariate/design missingness.                                                       |
| 15   | Outcome data              | Report outcome events or summary measures.                             | Results: Smoking cessation; Figure 2; Table 2.                                                                                                       |
| 16a  | Main results              | Report crude/adjusted estimates with precision and adjustment set.     | Table 2; Figure 3; Supplementary Tables S1–S2; Methods states prespecified adjustment set.                                                           |
| 16b  | Category boundaries       | Report boundaries when continuous variables are categorized.           | Methods: age categories, AUDIT-C cutoffs, MET threshold.                                                                                             |
| 16c  | Absolute risk translation | Translate relative measures to absolute risk when relevant.            | Not applicable: cross-sectional outcome modeled as former vs current smoking; weighted quit ratios are reported as absolute descriptive proportions. |
| 17   | Other analyses            | Report subgroup, sensitivity, and other analyses.                      | Region-specific models; quit-attempt exploratory analysis; Africa policy model; projections; diagnostics.                                            |
| 18   | Key results               | Summarize key findings with reference to objectives.                   | Discussion, opening paragraphs.                                                                                                                      |

| Item | Topic            | STROBE reporting requirement (paraphrased)                                   | Where addressed in manuscript                                                                                                         |
|------|------------------|------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| 19   | Limitations      | Discuss bias, imprecision, and direction/magnitude where possible.           | Discussion: Strengths and limitations.                                                                                                |
| 20   | Interpretation   | Provide cautious overall interpretation considering objectives and evidence. | Discussion and Conclusion.                                                                                                            |
| 21   | Generalisability | Discuss external validity/generalisability.                                  | Discussion: limitations of available surveys, complete-case regression sample, Africa-only policy data, sparse quit-attempt coverage. |
| 22   | Funding          | State funding and role of funders.                                           | Funding: no specific funding.                                                                                                         |

**Final revision note: The descriptive sample reconciliation has been incorporated into the manuscript. The imprecise post-2012 low-quit-ratio statement was removed rather than quantified without a reproducible threshold. This checklist maps to the finalized revised manuscript.**

### Supplementary Material 1

The survey-weighted logistic regression model, weighted maximum-likelihood estimating equation, and linearized ultimate-cluster variance estimator are specified below.

$$\text{logit}[\Pr(Y_i = 1)] = \ln\left(\frac{p_i}{1 - p_i}\right) = \beta_0 + \sum_{j=1}^k \beta_j x_{ij}$$

$Y_i = 1$  if respondent  $i$  is a former smoker (quit);  $x_{ij}$  is the  $j$ -th covariate (age, sex, education level, residence, marital status, comorbidities, WHO region, and survey year). The weighted maximum likelihood was estimated as:

$$\hat{\beta} = \underset{\beta}{\operatorname{argmax}} \sum_{i=1}^n w_i [y_i \ln p_i(\beta) + (1 - y_i) \ln(1 - p_i(\beta))]$$

$w_i$  is the Step 1 sampling weight (wstep1), rescaled so that  $\sum_i w_i = n$ . The variance was estimated as:

$$\begin{aligned} \text{Var}(\hat{\beta}) &= A^{-1}BA^{-1} \\ A &= \sum_i w_i \hat{p}_i(1 - \hat{p}_i)x_i x_i^T \\ B &= \sum_{h=1}^H \frac{n_h}{n_h - 1} \sum_{c=1}^{n_h} (u_{hc} - \bar{u}_h)(u_{hc} - \bar{u}_h)^T \\ u_{hc} &= \sum_{i \in (h,c)} w_i (y_i - \hat{p}_i)x_i \end{aligned}$$

Clusters  $c$  are primary sampling units (PSUs); strata  $h$  are sampling strata (stratum); design  $df = \sum_h n_h - H$  (PSUs minus strata).

**Supplementary Table S1. Region-specific survey-weighted multivariable logistic regression models of factors associated with successful smoking cessation among adult ever smokers in pooled cross-sectional WHO STEPS surveys, by WHO region, 2012–2023.**

| Predictor<br>(reference category) | AFRO               |   | EMRO              |   | EURO               |   | PAHO†         |   | WPRO             |   |
|-----------------------------------|--------------------|---|-------------------|---|--------------------|---|---------------|---|------------------|---|
|                                   | AOR (95% CI)       | p | AOR (95% CI)      | p | AOR (95% CI)       | p | AOR (95% CI)  | p | AOR (95% CI)     | p |
| Unweighted n / PSUs /             | 3,747 / 1,637 / 54 |   | 1,975 / 1,373 / 9 |   | 5,764 / 1,693 / 24 |   | 434 / 149 / 6 |   | 5,412 / 577 / 15 |   |

| <i>strata</i>                       |                  |         |                   |        |                  |         |                          |         |                   |        |
|-------------------------------------|------------------|---------|-------------------|--------|------------------|---------|--------------------------|---------|-------------------|--------|
| <b>Intercept</b>                    | 0.24 (0.14–0.41) | <0.001* | 1.11 (0.44–2.78)  | 0.825  | 0.30 (0.15–0.60) | 0.001*  | 14.40 (0.00–3,051,228.7) | 0.668   | 0.15 (0.05–0.49)  | 0.002* |
| Age 30–39 (ref: 18–29)              | 1.64 (1.15–2.34) | 0.007*  | 0.89 (0.43–1.81)  | 0.740  | 0.71 (0.49–1.03) | 0.073   | 1.71 (0.44–6.63)         | 0.435   | 1.86 (0.51–6.88)  | 0.349  |
| Age 40–49 (ref: 18–29)              | 2.33 (1.63–3.34) | <0.001* | 1.71 (0.92–3.18)  | 0.091  | 1.04 (0.70–1.56) | 0.835   | 7.05 (1.31–38.05)        | 0.024*  | 2.10 (0.59–7.46)  | 0.252  |
| Age 50–59 (ref: 18–29)              | 2.36 (1.61–3.45) | <0.001* | 2.73 (1.37–5.45)  | 0.004* | 1.11 (0.70–1.75) | 0.651   | 2.23 (0.37–13.35)        | 0.379   | 2.92 (0.88–9.64)  | 0.079  |
| Age 60–69 (ref: 18–29)              | 4.44 (2.85–6.93) | <0.001* | 4.47 (1.79–11.18) | 0.001* | 2.11 (1.42–3.13) | <0.001* | 14.52 (1.86–113.53)      | 0.011*  | 6.73 (1.88–24.11) | 0.004* |
| Female (ref: Male)                  | 1.08 (0.73–1.59) | 0.713   | 0.56 (0.17–1.91)  | 0.355  | 1.51 (1.17–1.97) | 0.002*  | 7.94 (2.77–22.79)        | <0.001* | 1.28 (0.76–2.17)  | 0.356  |
| Primary education (ref: n (ref: n)) | 1.17 (0.88–1.54) | 0.284   | 0.44 (0.21–0.94)  | 0.034* | 0.83 (0.49–1.43) | 0.503   | 4.03 (0.78–20.87)        | 0.096   | 1.34 (0.58–3.10)  | 0.498  |

|                                        |                  |         |                  |        |                  |        |                     |        |                  |        |
|----------------------------------------|------------------|---------|------------------|--------|------------------|--------|---------------------|--------|------------------|--------|
| None)                                  |                  |         |                  |        |                  |        |                     |        |                  |        |
| Secondary education (ref: None)        | 1.26 (0.96–1.65) | 0.093   | 0.54 (0.25–1.14) | 0.106  | 0.86 (0.52–1.40) | 0.536  | 2.66 (0.45–15.82)   | 0.280  | 2.08 (0.95–4.54) | 0.065  |
| Tertiary education (ref: None)         | 2.17 (1.47–3.21) | <0.001* | 0.40 (0.20–0.81) | 0.010* | 1.28 (0.78–2.11) | 0.335  | 21.98 (2.48–194.61) | 0.006* | 3.29 (1.23–8.77) | 0.018* |
| Urban residence (ref: Rural)           | 1.05 (0.81–1.37) | 0.706   | 0.86 (0.49–1.54) | 0.621  | 0.96 (0.76–1.22) | 0.744  | 2.75 (0.35–21.60)   | 0.334  | 0.86 (0.46–1.59) | 0.623  |
| Currently married (ref: Never married) | 1.22 (0.90–1.65) | 0.206   | 1.34 (0.66–2.72) | 0.410  | 1.64 (1.14–2.36) | 0.008* | 1.61 (0.41–6.28)    | 0.493  | 0.67 (0.22–2.07) | 0.488  |
| Formerly married                       | 0.74 (0.44–1.24) | 0.252   | 1.41 (0.44–4.53) | 0.567  | 1.38 (0.91–2.11) | 0.133  | 1.30 (0.27–6.20)    | 0.740  | 0.50 (0.10–2.46) | 0.396  |

|                                               |                      |             |                      |            |                      |             |                   |       |                      |           |
|-----------------------------------------------|----------------------|-------------|----------------------|------------|----------------------|-------------|-------------------|-------|----------------------|-----------|
| (ref:<br>Never<br>married)                    |                      |             |                      |            |                      |             |                   |       |                      |           |
| Diagnosed<br>hypertension (ref:<br>No)        | 1.24 (0.92–<br>1.65) | 0.154       | 1.25 (0.67–<br>2.32) | 0.48<br>3  | 1.44 (1.11–<br>1.87) | 0.006<br>*  | 2.86 (0.71–11.58) | 0.139 | 1.18 (0.68–<br>2.05) | 0.54<br>8 |
| Diagnosed<br>diabetes<br>(ref: No)            | 0.85 (0.50–<br>1.42) | 0.527       | 0.64 (0.23–<br>1.84) | 0.41<br>0  | 1.15 (0.48–<br>2.72) | 0.757       | 0.30 (0.01–6.06)  | 0.429 | 0.92 (0.39–<br>2.16) | 0.84<br>1 |
| Harmful<br>alcohol<br>use (ref:<br>No)        | 0.23 (0.12–<br>0.45) | <0.00<br>1* | 0.04 (0.00–<br>0.43) | 0.00<br>8* | 0.16 (0.07–<br>0.34) | <0.00<br>1* | 2.12 (0.27–16.95) | 0.475 | 0.75 (0.26–<br>2.17) | 0.59<br>9 |
| Insufficient<br>physical<br>activity<br>(ref: | 0.85 (0.62–<br>1.17) | 0.318       | 0.68 (0.41–<br>1.12) | 0.13<br>3  | 0.80 (0.62–<br>1.04) | 0.092       | 0.56 (0.15–2.06)  | 0.379 | 0.89 (0.46–<br>1.73) | 0.73<br>2 |

|                                                        |                      |            |                      |            |                      |       |                          |       |                      |           |
|--------------------------------------------------------|----------------------|------------|----------------------|------------|----------------------|-------|--------------------------|-------|----------------------|-----------|
| Sufficient<br>)                                        |                      |            |                      |            |                      |       |                          |       |                      |           |
| Survey<br>year<br>(AOR per<br>decade<br>since<br>2012) | 2.72 (1.34–<br>5.51) | 0.006<br>* | 0.27 (0.09–<br>0.83) | 0.02<br>3* | 0.68 (0.36–<br>1.29) | 0.242 | 0.00 (0.00–<br>18,653.2) | 0.329 | 0.96 (0.49–<br>1.87) | 0.89<br>6 |

\*Statistically significant at  $p < 0.05$ . † The Americas (PAHO) model (shaded) is based on a small regional sample ( $n = 434$ ) once restricted to complete survey design information; its very wide confidence intervals, including an unstable intercept and survey-year estimate, reflect genuine data sparsity and should be interpreted with real caution rather than treated as a coding error. Models were fitted independently within each region and were not formally tested for a region interaction; differences in coefficient magnitude across regions should be read as descriptive.

**Supplementary Table S2. Survey-weighted multivariable logistic regression of factors associated with successful smoking cessation among adult ever smokers in pooled cross-sectional WHO STEPS surveys across five WHO regions, 2012–2023 (n = 17,332; 5,429 PSUs; 108 strata).**

| <b>Predictor (reference category)</b>  | <b>AOR</b> | <b>95% CI</b> | <b>P-value</b> |
|----------------------------------------|------------|---------------|----------------|
| Age 30–39 (ref: 18–29)                 | 0.96       | 0.75–1.23     | 0.766          |
| Age 40–49 (ref: 18–29)                 | 1.42       | 1.10–1.84     | 0.007*         |
| Age 50–59 (ref: 18–29)                 | 1.53       | 1.13–2.06     | 0.005*         |
| Age 60–69 (ref: 18–29)                 | 2.96       | 2.24–3.92     | <0.001*        |
| Female (ref: Male)                     | 1.37       | 1.10–1.69     | 0.005*         |
| Primary education (ref: None)          | 1.06       | 0.84–1.34     | 0.632          |
| Secondary education (ref: None)        | 1.16       | 0.92–1.46     | 0.217          |
| Tertiary education (ref: None)         | 1.60       | 1.25–2.04     | <0.001*        |
| Urban residence (ref: Rural)           | 0.95       | 0.80–1.12     | 0.524          |
| Currently married (ref: Never married) | 1.46       | 1.17–1.84     | 0.001*         |
| Formerly married (ref: Never married)  | 1.13       | 0.84–1.54     | 0.415          |
| Diagnosed hypertension (ref: No)       | 1.31       | 1.09–1.57     | 0.004*         |
| Diagnosed diabetes (ref: No)           | 0.92       | 0.60–1.43     | 0.721          |

|                                                  |      |           |         |
|--------------------------------------------------|------|-----------|---------|
| Harmful alcohol use (ref: No)                    | 0.32 | 0.19–0.53 | <0.001* |
| Insufficient physical activity (ref: Sufficient) | 0.83 | 0.69–1.00 | 0.049*  |
| EMRO region (ref: AFRO)                          | 0.58 | 0.42–0.78 | <0.001* |
| EURO region (ref: AFRO)                          | 0.34 | 0.28–0.41 | <0.001* |
| PAHO region (ref: AFRO)                          | 1.27 | 0.77–2.10 | 0.339   |
| WPRO region (ref: AFRO)                          | 0.36 | 0.26–0.50 | <0.001* |
| Survey year (AOR per decade since 2012)          | 1.01 | 0.70–1.47 | 0.940   |

*\*Statistically significant at  $p < 0.05$ . AOR = adjusted odds ratio, from weighted maximum likelihood with ultimate-cluster linearized standard errors (see Methods). Model intercept AOR = 0.51 (95% CI 0.36–0.71).*

**Supplementary Table S3. Illustrative survey-weighted logit-linear extrapolations of smoking quit ratios for 2024, 2030, 2040, and 2050, overall and by WHO region, based on pooled cross-sectional WHO STEPS survey observations from 2012–2023.**

| Group                                        | Unweighted n<br>(extrapolation-<br>model sample) | Projected<br>2024<br>(%) | Projected<br>2030<br>(%) | Projected<br>2040<br>(%) | Projected<br>2050<br>(%) | Held-<br>constant<br>2018–2023<br>(%) | Year-<br>trend p |
|----------------------------------------------|--------------------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------------------|------------------|
| <b>Overall (all five WHO regions pooled)</b> | <b>44,647</b>                                    | <b>32.9%</b>             | <b>34.4%</b>             | <b>36.8%</b>             | <b>39.4%</b>             | <b>33.0%</b>                          | <b>0.40</b>      |
| Africa (AFRO)                                | 10,243                                           | 69.6%                    | 85.6%                    | 96.7%                    | 99.3%                    | 41.2%                                 | <0.001*          |
| Eastern Mediterranean (EMRO)                 | 5,806                                            | 41.5%                    | 51.4%                    | 67.3%                    | 80.0%                    | 34.2%                                 | 0.01*            |
| Europe / Central Asia (EURO)                 | 9,833                                            | 40.2%                    | 48.6%                    | 62.6%                    | 74.7%                    | 34.7%                                 | 0.12             |
| Americas (PAHO)                              | 4,623                                            | 71.5%                    | 78.5%                    | 87.2%                    | 92.7%                    | 63.5%                                 | 0.38             |
| Western Pacific (WPRO)                       | 14,142                                           | 24.2%                    | 23.4%                    | 22.0%                    | 20.7%                    | 24.6%                                 | 0.69             |

**Note:** Projections are illustrative extrapolations from simple survey-weighted logit-linear models with survey year as the sole predictor and should not be interpreted as forecasts. The year-only models and the fully adjusted multivariable models answer different questions; accordingly, their estimated temporal associations may differ in magnitude or direction. In the corresponding multivariable analyses, diagnostic assessment identified evidence of non-linearity in the survey-year association for the pooled and AFRO models (quadratic-year Wald  $p = 0.001$  and  $p < 0.001$ , respectively), but not for EMRO, EURO, PAHO, or WPRO. The pooled and AFRO linear year estimates should therefore be interpreted as summaries of the average temporal association over 2012–2023 rather than as evidence of a constant year-on-year change. This provides an additional reason for caution when interpreting the

corresponding long-range illustrative extrapolations.

**Supplementary Table S4. Adjusted generalized variance inflation factors by predictor term for the pooled, region-specific, and Africa-specific survey-weighted multivariable logistic regression models of successful smoking cessation, WHO STEPS surveys, 2012–2023.**

| Pooled model (all five WHO regions) |    |       |                                             |
|-------------------------------------|----|-------|---------------------------------------------|
| Term                                | df | GVIF  | Adjusted GVIF<br>[GVIF <sup>1</sup> /(2df)] |
| Survey year                         | 1  | 1.572 | 1.254                                       |
| Who region                          | 4  | 2.906 | 1.143                                       |
| Marital status                      | 2  | 1.639 | 1.132                                       |
| Educational attainment              | 3  | 1.806 | 1.104                                       |
| Sex                                 | 1  | 1.16  | 1.077                                       |
| Age group                           | 4  | 1.712 | 1.07                                        |
| Residence                           | 1  | 1.13  | 1.063                                       |
| Hypertension                        | 1  | 1.126 | 1.061                                       |
| Diabetes                            | 1  | 1.07  | 1.034                                       |
| Physical activity                   | 1  | 1.032 | 1.016                                       |
| Harmful alcohol use                 | 1  | 1.027 | 1.014                                       |
|                                     |    |       |                                             |

| Africa (AFRO)                |    |       |                                 |
|------------------------------|----|-------|---------------------------------|
| Term                         | df | GVIF  | Adjusted GVIF<br>[GVIF^1/(2df)] |
| Marital status               | 2  | 1.98  | 1.186                           |
| Age group                    | 4  | 2.056 | 1.094                           |
| Sex                          | 1  | 1.189 | 1.09                            |
| Residence                    | 1  | 1.164 | 1.079                           |
| Survey year                  | 1  | 1.145 | 1.07                            |
| Hypertension                 | 1  | 1.114 | 1.055                           |
| Educational attainment       | 3  | 1.266 | 1.04                            |
| Physical activity            | 1  | 1.039 | 1.019                           |
| Harmful alcohol use          | 1  | 1.01  | 1.005                           |
| Diabetes                     | 1  | 1.006 | 1.003                           |
|                              |    |       |                                 |
| Eastern Mediterranean (EMRO) |    |       |                                 |
| Term                         | df | GVIF  | Adjusted GVIF<br>[GVIF^1/(2df)] |
| Residence                    | 1  | 1.752 | 1.324                           |
| Marital status               | 2  | 1.861 | 1.168                           |
| Sex                          | 1  | 1.351 | 1.162                           |
| Survey year                  | 1  | 1.292 | 1.137                           |

| Hypertension                 | 1  | 1.204 | 1.097                                       |
|------------------------------|----|-------|---------------------------------------------|
| Educational attainment       | 3  | 1.676 | 1.09                                        |
| Physical activity            | 1  | 1.171 | 1.082                                       |
| Age group                    | 4  | 1.657 | 1.065                                       |
| Harmful alcohol use          | 1  | 1.039 | 1.019                                       |
| Diabetes                     | 1  | 1.022 | 1.011                                       |
|                              |    |       |                                             |
| Europe / Central Asia (EURO) |    |       |                                             |
| Term                         | df | GVIF  | Adjusted GVIF<br>[GVIF <sup>1</sup> /(2df)] |
| Survey year                  | 1  | 1.328 | 1.152                                       |
| Marital status               | 2  | 1.45  | 1.097                                       |
| Hypertension                 | 1  | 1.135 | 1.065                                       |
| Age group                    | 4  | 1.579 | 1.059                                       |
| Sex                          | 1  | 1.12  | 1.058                                       |
| Educational attainment       | 3  | 1.317 | 1.047                                       |
| Physical activity            | 1  | 1.022 | 1.011                                       |
| Harmful alcohol use          | 1  | 1.02  | 1.01                                        |
| Diabetes                     | 1  | 1.019 | 1.01                                        |
| Residence                    | 1  | 1.011 | 1.005                                       |
|                              |    |       |                                             |

| Americas (PAHO)        |    |       |                                 |
|------------------------|----|-------|---------------------------------|
| Term                   | df | GVIF  | Adjusted GVIF<br>[GVIF^1/(2df)] |
| Hypertension           | 1  | 1.606 | 1.267                           |
| Survey year            | 1  | 1.572 | 1.254                           |
| Physical activity      | 1  | 1.519 | 1.233                           |
| Marital status         | 2  | 2.178 | 1.215                           |
| Age group              | 4  | 3.11  | 1.152                           |
| Sex                    | 1  | 1.284 | 1.133                           |
| Educational attainment | 3  | 1.92  | 1.115                           |
| Residence              | 1  | 1.149 | 1.072                           |
| Diabetes               | 1  | 1.13  | 1.063                           |
| Harmful alcohol use    | 1  | 1.118 | 1.058                           |
|                        |    |       |                                 |
| Western Pacific (WPRO) |    |       |                                 |
| Term                   | df | GVIF  | Adjusted GVIF<br>[GVIF^1/(2df)] |
| Marital status         | 2  | 2.191 | 1.217                           |
| Age group              | 4  | 2.776 | 1.136                           |
| Survey year            | 1  | 1.269 | 1.127                           |
| Hypertension           | 1  | 1.186 | 1.089                           |

|                        |   |       |       |
|------------------------|---|-------|-------|
| Sex                    | 1 | 1.166 | 1.08  |
| Diabetes               | 1 | 1.117 | 1.057 |
| Residence              | 1 | 1.109 | 1.053 |
| Educational attainment | 3 | 1.21  | 1.032 |
| Harmful alcohol use    | 1 | 1.064 | 1.032 |
| Physical activity      | 1 | 1.058 | 1.029 |

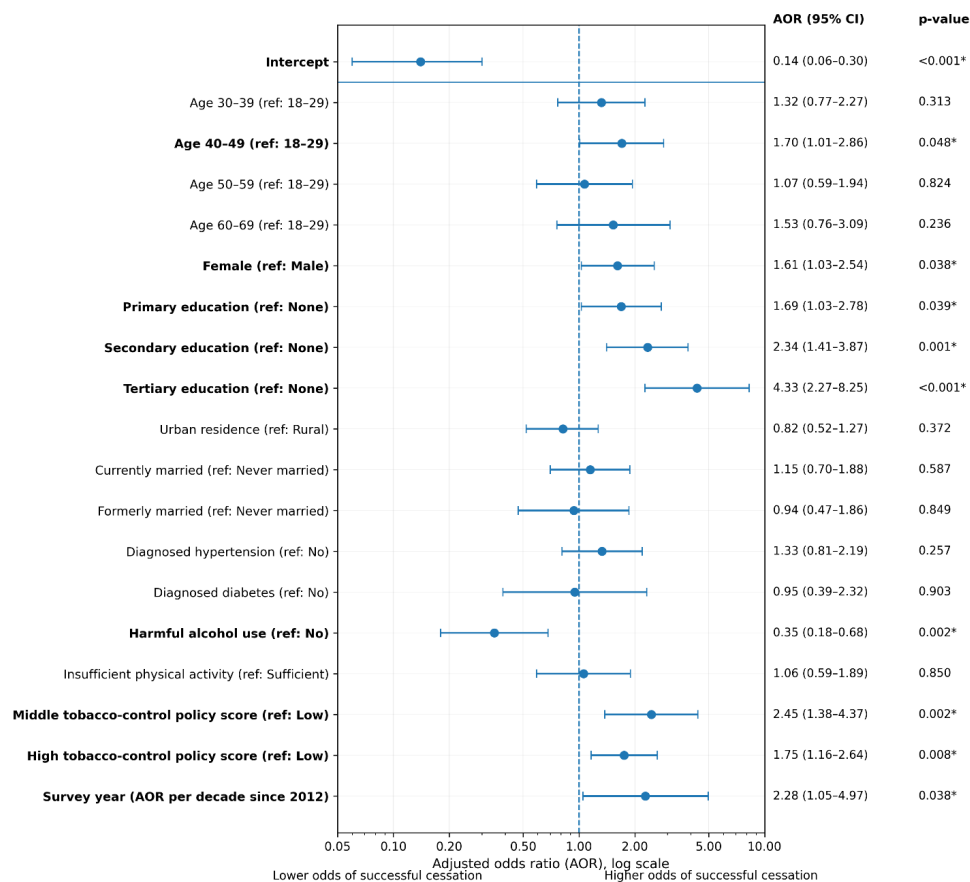
**Supplementary Table S5. Summary of regression diagnostics across the pooled, region-specific, and Africa-specific survey-weighted multivariable logistic regression models of successful smoking cessation, WHO STEPS surveys, 2012–2023**

| Model                                | n      | Max<br>adjusted<br>GVIF | Term with<br>max GVIF | Quadratic-<br>year<br>Wald p | Nonlinea<br>rity<br>evidence<br>? | Converged<br>(iterations<br>) | Separati<br>on<br>flag |
|--------------------------------------|--------|-------------------------|-----------------------|------------------------------|-----------------------------------|-------------------------------|------------------------|
| <b>Pooled (all five<br/>regions)</b> | 17,332 | 1.25                    | Survey year           | 0.001*                       | Yes                               | Yes (6)                       | No                     |
| <b>Africa</b>                        | 3,747  | 1.19                    | Marital status        | <0.001*                      | Yes                               | Yes (6)                       | No                     |
| <b>Eastern<br/>Mediterranean</b>     | 1,975  | 1.32                    | Residence             | 0.106                        | No                                | Yes (7)                       | No                     |
| <b>Europe / Central<br/>Asia</b>     | 5,764  | 1.15                    | Survey year           | 0.356                        | No                                | Yes (7)                       | No                     |
| <b>Americas</b>                      | 434    | 1.27                    | Hypertension          | 0.329                        | No                                | Yes (7)                       | FLAGGED                |
| <b>Western Pacific</b>               | 5,412  | 1.22                    | Marital status        | 0.299                        | No                                | Yes (6)                       | No                     |

\*Statistically significant at  $p < 0.05$ . GVIF = generalized variance inflation factor. The pooled and Africa models' significant nonlinearity finding means the linear year term, and the illustrative logit-linear projections built from it in Supplementary Table S3, should be

read as a summary of the average direction of the trend rather than a fully adequate description of its shape. The Americas (PAHO) separation flag reflects its small regional sample ( $n = 434$ ; 149 primary sampling units; 6 strata) rather than a coding error; readers should treat its individual coefficients, especially the intercept and survey-year terms, with particular caution, as noted wherever the PAHO model appears in this study.

**Supplementary Figure S1. Survey-weighted adjusted odds ratios and 95% confidence intervals for factors associated with successful smoking cessation, including national tobacco-control policy score, among adult ever smokers in the WHO African Region, pooled cross-sectional WHO STEPS surveys, 2012–2023 (n = 2,520; 1331 PSUs; 50 strata).**



\* p < 0.05. Vertical reference line = AOR 1.00.

**Supplementary Figure S2. Conceptual mapping of demographic, behavioral, comorbidity, quit-attempt, and tobacco-control policy findings from pooled cross-sectional WHO STEPS surveys, 2012–2023, to Levesque’s Access to Health Care framework.**

