Request for Expression of Interest

1. Description of Requirements

The World Health Organization (WHO) invites vendors to submit an Expression of Interest (EOI) for **Modelling Approaches to Produce Estimates of National Immunization Coverage** which address the specific objectives to develop a model, or another analytical approach, to produce annual estimates of vaccination coverage consistent with the parameters described above. At a minimum,

- The model must produce national-level estimates for each of the 195 countries, for each of five vaccine-dose combinations, for each year during 2000–2017. Vaccine-dose combinations will include:
  + first dose diphtheria-tetanus-pertussis (DTP1) containing vaccine;
  + third dose diphtheria-tetanus-pertussis (DTP3) containing vaccine;
  + first dose measles containing vaccine (MCV1);
  + second dose measles containing vaccine (MCV2); and
  + third dose pneumococcal conjugate vaccine (PCV3).
- The modelled estimates must be reproducible.
- The model must allow for annual updates of the vaccination coverage time-series for each country.
- The model can be stochastic or deterministic and should have a measure of uncertainty around estimated coverage values.

Background

- The World Health Organization (WHO) and United Nations Children’s Fund (UNICEF) make extensive use of statistical estimates for key health indicators as part of their institutional mandates to monitor the health and well-being of all peoples, regardless of who they are or where they live. In fact, the production and dissemination of health statistics for health action at the country, regional, and global levels are core WHO activities mandated by the Member States of the World Health Assembly in WHO’s Constitution.¹
- Since 2001, WHO and UNICEF have jointly reviewed immunization system performance data and produced estimates of national immunization coverage² alongside global and regional summaries of those estimates. In addition to monitoring the current status and trends in coverage, the WHO and UNICEF estimates of national immunization coverage (WUenic) are used for monitoring progress towards global goals and targets, such as those in the Sustainable Development Goals (SDGs) and the Global Vaccine Action Plan (GVAP).

Current WHO and UNICEF estimation approach and parameters

² Vaccination coverage is the percentage of a target population that has received a specific vaccine-dose.
• Currently, WHO and UNICEF produce annual coverage estimates at the national-level for up to 14 vaccine-dose combinations for 195 countries. WUENIC are produced once per year. The historical time-series of estimates is updated annually in the presence of new data for the current revision year or for prior years. The most recent year of vaccination coverage estimates is 2017 (released in July 2018).

• A description of the basic principles underlying WUENIC is described elsewhere. WHO and UNICEF currently utilize a computational logic (rule-based or deterministic) approach to produce estimates of national vaccination coverage. This approach enables incorporation of multiple input data sources, expert judgement and interpolation/calibration methods while ensuring transparency and replicability as well as making process documentation computationally accessible. This approach does not contain any stochastic process, all the adjustments are deterministic. A qualitative measure of uncertainty in the coverage estimates is also produced. Both input and output data are made publicly available through WHO and UNICEF websites.

Purpose

• Proposals are sought for expressions of interest for modelling approaches to produce annual estimates of vaccination coverage for 195 countries. The countries will be specified by WHO and UNICEF to selected proposals.

Available Input Information

WUENIC input data alongside other vaccine-preventable disease related data are available online at http://www.who.int/immunization/monitoring_surveillance/data. In addition, WHO and UNICEF will provide the following data:

• Reported administrative coverage data (numerator data: number of vaccine doses administered; denominator data: number of children in the target population; administrative coverage);
• Reported country official coverage estimates;
• Vaccination coverage survey data (e.g., estimated coverage, survey sample size)
• Reported national immunization schedule data;
• Year of vaccine introduction data;
• Reported vaccine stock-out data;
• UNPD estimated population data (births, surviving infants)

Models are not limited to use of the above data. Note that because estimates are updated annually, development model input data sources are encouraged to be available such that WHO and UNICEF can readily and reliably access the information going forward.

2. Minimum Criteria for Applicants

Only teams with documented experience and expertise on the methodological approach being proposed will be considered.

3. Expression of Interest Instructions

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Last updated 22 January 2019.
Applicants interested in fulfilling the requirements are requested to express their interest by submitting a summary proposal (see below), together with their Expression of Interest in response to points 1. and 2. above, to the Contact Address (as stated above) not later than the Closing Date (as stated above):

Summary proposals should be brief, ideally limited to no more than five (5) pages (not including CVs). Proposals should be written in plain English language and include a:

- Brief description of the conduct of the proposed work;
- Brief description of the motivation for the expected software package or computing language to be used.
- Brief description of the team applicant’s relevant experience in modelling, estimation and any other proposed approach; and
- Description of the staffing plan to complete the project with CVs.

No preliminary modelling output data is required at this stage. Only the methodology is requested.

Any information considered by interested entities as confidential must be clearly marked "confidential".

Incomplete Expressions of Interest and Expressions of Interest submitted after the Closing Date will, in principle, be disregarded, unless WHO decides otherwise, in its sole discretion.

**Proposal Evaluation Criteria**

Proposals will be assessed based on the following:

- Satisfaction of objectives noted above.
- Experience in developing applied mathematical models, logic-based models or use of artificial intelligence, deep learning, neural networks or other machine learning-based techniques.
- Ease of reproducibility and required computing resources and development costs, with the goal of ensuring sustainability.

**Final deliverables/outputs of selected proposals**

Summary proposals included with the expression of interest will be reviewed by WHO and UNICEF, and will be shared with members of WHO’s Immunization and vaccines related implementation research advisory committee (IVIR-AC). Authors of selected proposals will be invited to develop full proposals including timeline for completion of work and budget in US dollar, which should include all costs for conducting the work described by 20 December 2019. It is expected that the selected summary proposals will receive some financial support to develop a full proposal.

Final proposals will be expected to provide the following outputs:

- A detailed description of modelling methods and assumptions as well as the input data used;
- A description of the modelling approach in plain English;
- A theoretical justification of complex methods used, if applicable;
- A self-contained environment where the model itself can be run independently by WHO and UNICEF with the assistance of operational documentation;
- A description and copy of modelling diagnostic and validation checks;
- A description of the software and computing resources needed to run the model(s);
- If custom a software solution (e.g. an R or Python package) was developed for this work, please provide a documentation of the such package with necessary dependencies;
- A documented CSV file containing results of the country-vaccine-year combinations (for all 195 countries, five vaccine-dose combinations across the period 2000–2017);
- A description of any foreseen costs associated with model maintenance or updating.

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It is preferred to include an example of a visual presentation or other communication elements of the estimation results.

Submission and Timelines

- Submissions should be emailed to vpdata@who.int and immdata@unicef.org; include “Coverage Modelling” in the subject line.
- Proposals should be received no later than 11:59pm (New York City, USA) on 24 February 2019.
- WHO and UNICEF may contact applicants to request further information or clarifications.
- Expressions of interest will be reviewed between late February and March 2019.
- Authors of selected summary proposals will be contacted soon thereafter to move forward with the development of a full proposal, including some model development work.
- Among selectees, all model development work must be completed by 20 December 2019.

Contact

Questions related to this call for expressions of interest should be directed to vpdata@who.int and immdata@unicef.org.

4. Disclaimer

Any work resulting from this project, including but not limited to the methods and software solutions, will be property of WHO and UNICEF and is subject to adaptation; proper acknowledgments will be included. No publication shall be made without prior consent of WHO and UNICEF.

This Request for Expression of Interest is not a solicitation, and replying to it does not guarantee that a team will be invited to any solicitation by WHO. No further details of the planned solicitation will be made available to the applicants prior to the issuance of solicitation documents. In the event of a solicitation for the subject matter described herein, any Request for Proposal and any subsequent purchase order or contract will be issued in accordance with WHO’s rules and procedures.

Any and all costs and expenses incurred in relation to, or ensuing from, the submission of an Expression of Interest will exclusively be borne by the applicant. The application and selection process set forth in this document will not be subject to claims for financial compensation of any kind whatsoever.

WHO is acting in good faith by issuing this Request for Expression of Interest, however, this Request for Expression of Interest does not entail any commitment on the part of WHO, either financial or otherwise. WHO reserves the right to send solicitation documents to applicants identified by WHO through means other than this Request for Expression of Interest; reject any or all Expression(s) of Interest, without incurring any obligation to inform the affected applicant(s) of that decision or the grounds thereof; and/or change or cancel the procurement process at any time, including during the Request for Expression of Interest or formal solicitation processes.

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