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- **Qualitative assessment methods**

Method type	References	Strenghts	Limits
Opinion survey	Nsubuga et al, 2002 Riera-Montes and Velicko 2011	Rapid and not too ressource consuming	Limited flexibility, limited understanding of factors affecting acceptability
Participatory approach	Sawford et al, 2012; Bronner et al, 2014	Allows to identify factors influencing reporting attitude and perception of surveillance	Time consuming, purely qualitative

- **Semi-quantitative assessment methods**

Method type	References	Strenghts	Limits
Structured questionnaire survey (OASIS fr OASIS En)	Hendrikx et al., 2011	Allows to identify targeted corrective actions	limited flexibility, based on pre-defined requirement criteria which may not apply to all cases
Participatory approach	Elbers et al, 2010; Paterson et al., 2012	Allows to identify factors influencing reporting attitude and perception of surveillance	Time consuming
Participatory approach (AccePT)	Calba et al., 2015	Well documented method, step by step approach; semi-quantification of level of acceptability per actors and per aspect of the system, provide context-dependant recommendations, information related to the context	Time consuming, specific training required, highly dependant on stakeholders' willingness to participate

- **Quantitative assessment methods**

Method type	References	Strenghts	Limits

Conjoint analysis	Delabouglise et al,2015 Pham et al., 2016 (submitted)	Quantitative estimation of factors (preferences and anticipations) affecting acceptability either positively or negatively	Time consuming, specific training required, highly dependant on stakeholders' willingness to participate, failure to collect relevant data may occur

Availability and sustainability

- **Qualitative methods**

Method type	References	Strenghts	Limits
Opinion survey	Clothier HJ, et al. 2005		Based on individual perception
Structured questionnaire survey	Hendrikx et al., 2011	Allows to identify targeted corrective actions	Limited flexibility, based on pre-defined requirement criteria which may not apply to all cases

Bias

- **Quantitative assessment methods**

Method type	References	Strengths	Limits
Multilist CRC	Hook EB. 1995 (human health); Del Rio Vilas VJ, Pfeiffer DU. 2010 (animal health); Vergne T. 2015 (animal health)	Quantitative estimation of the bias. May also allow the identification of the variables significantly associated with the under-reporting rate.	Need data produced by multiple surveillance components. Surveillance components should not be mutually exclusive.
Unilist CRC	Del Rio Vilas VJ, Böhning D. 2008; Hook EB. 1995 (human health); Vergne T. 2015 (animal health)	Quantitative estimation of the bias. May also allow the identification of the variables significantly associated with the under-reporting rate.	Need data allowing the successive detection by the surveillance system of the epidemiological units presenting the characteristics of interest.
Data-driven mathematical model	Baguelin, 2013	Allows inferring other transmission parameters at the same time	Heavy in terms of computer power and programming skills

Flexibility

- **Qualitative assessment methods**

Method type	References	Strengths	Limits

Opinion survey	Jefferson H, et al. 2008	Allows to identify potential factors influencing flexibility	Based on individual perception, purely qualitative
Semi-structured interviews; inspections; descriptive analysis	Paterson et al, 2012; Riera-Montes and Velicko 2011	Allows to identify potential factors influencing flexibility	Based on individual perception, purely qualitative

- **Semi-quantitative assessment methods**

Method type	References	Strengths	Limits
Structured questionnaire survey (OASIS fr OASIS En)	Hendrikx et al., 2011	Allows to identify targeted corrective actions	Limited flexibility, based on pre-defined requirement criteria which may not apply to all cases

Multiple hazard

- **Qualitative assessment methods**

Method type	References	Strengths	Limits
Opinion survey	Bingle et al, 2005		Based on individual perception, purely qualitative

Precision

- **Quantitative assessment methods**

Method type	References	Strengths	Limits
Multilist CRC		Identification of the variables significantly associated with the under-reporting rate.	Need data allowing the successive detection by the surveillance system of the epidemiological units presenting the characteristics of interest.

Representativeness

- **Quantitative assessment methods**

Method type	References	Strengths	Limits
Unilist CRC	Hook EB. 1995 (human health); Vergne T. 2015 (animal health)	Identification of the variables significantly associated with the under-reporting rate.	Need data produced by multiple surveillance components. Surveillance components should not be mutually exclusive.

Multilist CRC	Del Rio Vilas VJ, Böhning D. 2008; Hook EB. 1995 (human health); Vergne T. 2015 (animal health)	Identification of the variables significantly associated with the under-reporting rate.	Need data allowing the successive detection by the surveillance system of the epidemiological units presenting the characteristics of interest.
Spatial evaluation	Lynn T, et al. 2007	Identification of poorly represented geographical areas	Need accurate data on the spatial distribution of the target population
Use of outputs from other surveillance components	Macarthur C, Pless IB. 1999	Regression analysis reduces the effects of confounding variables	One other surveillance component used as a standard reference. The two components must not be mutually exclusive

- **Semi-quantitative assessment methods**

Method type	References	Strengths	Limits
Structured questionnaire survey ((OASIS fr OASIS En))	Hendrikx et al., 2011	Allows to identify targeted corrective actions	Scoring. Not a real measure of representativity. Based on pre-defined requirement criteria which may not apply to all cases

Risk based criteria definition

- **Qualitative assessment methods**

Method type	References	Strengths	Limits
EVARISK	RISKSUR research project	Provides information on the strenght of the risk based component, based on the quality of the risk criteria definition.	Does not provide specific recommendations on how to improve the risk definition as such, this information has to be retreived from the evaluation grid.

Sensitivity

- **Quantitative assessment methods**

Method type	References	Strengths	Limits

Multilist CRC	Hook EB. 1995 (human health); Vergne T. 2015 (animal health)	Quantitative estimation of the sensitivity. May also allow the identification of the variables significantly associated with the under-reporting rate.	Need data produced by multiple surveillance components. Surveillance components should not be mutually exclusive.
Unilist CRC	Del Rio Vilas VJ, Böhning D. 2008; Hook EB. 1995 (human health); Vergne T. 2015 (animal health)	Quantitative estimation of the sensitivity. May also allow the identification of the variables significantly associated with the under-reporting rate.	Need data allowing the successive detection by the surveillance system of the epidemiological units presenting the characteristics of interest.
Stochastic modelling	Audigé L and Becket S. 1999; Cameron AR, Baldock FC, 1998 (for integration of Se and Sp of diagnositic tests); Audigé L and Becket S. 1999	Stochastic approach: acount for probabilistic distributions.	Assumption of representativeness of the sample. Not applicable to risk based surveillance
Stochastic scenario tree modelling	Martin PAJ et al. 2007; Martin PAJ 2008	Stochastic approach: acount for probabilistic distributions. Enables all available evidence about disease status to be used, explicitly, transparently and quantitatively. Applicable to all components of surveillance, including risk-based surveillance designs.	Use of expert opinion. Further work is required to develop acceptable approaches of expert opinion to generate inputs for this type of model
Stochastic scenario trees modelling using matrix algebra and Bayesian belief networks	Hood GM, et al. 2009	Like scenario tree modelling, stochastic approach acounts for probabilistic distributions. enables all available evidence about disease status to be used, explicitly, transparently and quantitatively. Applicable to risk-based surveillance. Formulation as a matrix permits an automatisation of the analysis.	Matrix formulation can make implementation tedious. Use of expert opinion. Further work is required to develop acceptable approaches of expert opinion to generate inputs for this type of model

Ratio of number cases captured by the active surveillance and total number of cases captured	Lynn T, et al. 2007	Simple method	Assumption of perfect specificity. Assumption that the denominator is the total number of cases, which is most likely unrealistic: there are always missed cases. Sensitivity ratio nearly always overestimated.
Epidemiological approach	Siegrist et al 2004, Verma et al. 2014; Watkins RE et al 2006	Relies solely on actual data, no simulation is conducted that might inadvertently introduce bias into the assessment. Allows complexities associated with the determination of occurrence of events to be considered for each potential outbreak	There remains uncertainty about the exact start, detection and end date of outbreaks and size of outbreaks. Epidemiological investigations can be resource intensive, and detailed descriptions of the investigations performed and the decision-making processes used are required to fully understand the basis of the outbreak definition applied. variability in opinion among experts must be appropriately
Assessment of syndromic surveillance outputs using another surveillance component as a "gold standard" (derived approach)	Zhang, 2014; Watkins RE et al 2006	Relies solely on actual data; no simulation is conducted that might inadvertently introduce bias into the assessment	Assumption of perfect sensitivity and specificity of the surveillance component used as "gold standard"The two components must not be mutually exclusive
Simulation approach	Mandl et al. 2004, Izadi M, et al. 2009, Jafarpour et al. 2015; Watkins RE et al 2006	Enables to determine the occurence and timing of outbreaks within the data. Possible to apply it in case of lack of real surveillance data. Enables quantitative replicable evaluation of performance indicators.	Parameters of simulations influence the evaluation outcomes which may not reflect the system or process being modelled. The simulated outbreaks may not reflect the pattern of true outbreak in real conditions. Therefore the usefulness of synthetic data for evaluation is linked to the assumptions used to construct the data, which influences the ability to generalise evaluation findings to the authentic context.
Bayesian Network Model	Izadi M, et al. 2009, Jafarpour et al. 2015; Izadi M, et al. 2009, Jafarpour et al. 2015	Same advantages as other methods using simulation approach. Use of bayesian network allows to assess the effect of a change in one algorithm parameter and one performance attribute on the level ofall performance attributes.	Same limitations and assumptions as other methods using simulation approach. Use of bayesian network is intensive in programming skills.

Data-driven mathematical model	Baguelin, 2013	Allows inferring other transmission parameters at the same time	Heavy in terms of computer power and programming skills
In situ observation	Paterson et al, 2012	Observation in situ: no record bias	Direct observation on the field: ressource and time consuming. Only a rough estimate of the rate of underreporting of observed cases by the local stakeholders. Does not account for unobserved cases.

- **Semi-quantitative assessment methods**

Method type	References	Strengths	Limits
Structured questionnaire survey (OASIS fr OASIS En)	Hendrikx et al., 2011	Allows to identify targeted corrective actions	Scoring. Not a real measure of sensitivity. Based on pre-defined requirement criteria which may not apply to all cases

Specificity

- **Quantitative assessment methods**

Method type	References	Strengths	Limits
Use of outputs from other surveillance components	Zhang, 2014; Watkins RE et al 2006	Relies solely on actual data; no simulation is conducted that might inadvertently introduce bias into the assessment	Assumption of perfect sensitivity and specificity of the surveillance component used as “gold standard”. The two components must not be mutually exclusive
Epidemiological approach	Siegrist et al 2004, Verma et al. 2014; Watkins RE et al 2006	Relies solely on actual data; no simulation is conducted that might inadvertently introduce bias into the assessment. Allows complexities associated with the determination of occurrence of events to be considered for each potential outbreak	There remains uncertainty about the exact start, detection and end date of outbreaks and size of outbreaks. Epidemiological investigations can be resource intensive, and detailed descriptions of the investigations performed and the decision-making processes used are required to fully understand the basis of the outbreak definition applied. variability in opinion among experts must be appropriately managed.

Simulation approach	Mandl et al. 2004, Izadi M, et al. 2009, Jafarpour et al. 2015; Watkins RE et al 2006	Enables to determine the occurence and timing of outbreaks within the data. Possible to apply it in case of lack of real surveillance data. Enables quantitative replicable evaluation of performance indicators.	Parameters of simulations influence the evaluation outcomes which may not reflect the system or process being modelled. The simulated outbreaks may not reflect the pattern of true outbreak in real conditions. Therefore the usefulness of synthetic data for evaluation is linked to the assumptions used to construct the data, which influences the ability to generalise evaluation findings to the authentic context.
Bayesian Network Model	Izadi M, et al. 2009, Jafarpour et al. 2015; Izadi M, et al. 2009, Jafarpour et al. 2015	Same advantages as other methods using simulation approach. Use of bayesian network allows to assess the effect of a change in one algorithm parameter and one performance attribute on the level ofall performance attributes.	Parameters of simulations influence the evaluation outcomes which may not reflect the system or process being modelled. The simulated outbreaks may not reflect the pattern of true outbreak in real conditions. Therefore the usefulness of synthetic data for evaluation is linked to the assumptions used to construct the data, which influences the ability to generalise evaluation findings to the authentic context.

- **Semi-quantitative assessment methods**

Method type	References	Strengths	Limits
Structured questionnaire survey (OASIS)	Hendrikx et al., 2011	Allows to identify targeted corrective actions	Scoring. Not a real measure of specificity. Based on pre-defined requirement criteria which may not apply to all cases

[[/Surveillance%20system%20organisation|Surveillance system organisation]]

Method type	References	Strengths	Limits
SWOT (Strenghts/Weaknesses/ Opportunity/ Threats)		Take into consideration internal aspects of the system but also external factors affecting the system performances	Requires a very good knowledge of the system and/or involvement of the right system actors in the analysis. No standard method.

Structured questionnaire survey (OASIS)	Hendrikx et al., 2011	Ready to use questionnaire to describe the system organisation in details. Ready to use evaluation grid to assess the strenghts and weaknesses of the system. Allow to identify corrective action to target	The questionnaire should be filled in with expert of the surveillance system under evaluation. Evaluation criteria pre-defined which reduce the flexibility of the tool. Some results might not fit all systems. However, the scoring could be reviewed and amended.
SERVAL	Drewe et al., 2015	Provides a series of questions to assess the organisation of the system and also provides an evaluation framework and workplan	Should be used by expert in the system and by people with knowledge on evaluation. The tool does not provide guidance on recommendations for corrective actions.
System mapping		Provide a detailed description of the surveillance system network of actors and actions linking the different actors together.	No standard method available. Should be performed by people with very good knowledge of the system. Do not provide information on the strenghts and weaknesses, should be combined with SWOT/OASIS or SERVAL method

Timeliness

- **Quantitative assessment methods**

Method type	References	Strengths	Limits
Analysis of the surveillance historical data	Takahashi T et al 2004	Simple method	Long study period needed. Does not take into consideration all parameters. Only an estimate of the time between detection and notification but not a complete measure of timeliness (start date of outbreak unknown).
Analysis of the surveillance historical data	Del Rocio Amezcua et al. 2010; Riera-Montes and Velicko 2011	Simple method	Only an estimate of the time between detection and notification but not a complete measure of timeliness (start date of outbreak unknown)

Epidemiological approach	Siegrist et al 2004; Watkins RE et al 2006	Estimation of true timeliness (from the outbreak start date to the capture date). Relies solely on actual data; no simulation is conducted that might inadvertently introduce bias into the assessment. Allows complexities associated with the determination of occurrence of events to be considered for each potential outbreak.	There remains uncertainty about the exact start, detection and end date of outbreaks and size of outbreaks. Epidemiological investigations can be resource intensive, and detailed descriptions of the investigations performed and the decision-making processes used are required to fully understand the basis of the outbreak definition applied. variability in opinion among experts must be appropriately managed.
Use of outputs from other surveillance components	Zhang, 2014; Watkins RE et al 2006	Relies solely on actual data; no simulation is conducted that might inadvertently introduce bias into the assessment	Assumption that the surveillance component used as “gold standard” immediately detects the outbreak, which is most likely unrealistic. The two components must not be mutually exclusive.
Bayesian Network Model	Izadi M, et al. 2009, Jafarpour et al. 2015; Izadi M, et al. 2009, Jafarpour et al. 2015	Estimation of true timeliness (from the outbreak start date to the capture date). Simulation of surveillance data enables to determine the occurence and timing of outbreaks within the data. Possible to apply it in case of lack of real surveillance data. Enables quantitative replicable evaluation of performance indicators. Use of bayesian network allows to assess the effect of a change in one algorithm parameter and one performance attribute on the level ofall performance attributes.	Parameters of simulations influence the evaluation outcomes which may not reflect the system or process being modelled. The simulated outbreaks may not reflect the pattern of true outbreak in real conditions. Use of bayesian network is intensive in programming skills.
Data-driven mathematical model	Walker, 2010	Estimation of true timeliness (from the outbreak start date to the capture date) Allows inferring other transmission parameters at the same time	Heavy in terms of computer power and programming skills
In situ observation	Rumisha SF, et al. 2007; Paterson et al, 2012	Observation in situ: no record bias	Direct observation on the field: ressource and time consuming. Only an estimate of the time between detection and notification but not a complete measure of timeliness (start date of outbreak unknown).

- **Semi-quantitative assessment methods**

Method type	References	Strengths	Limits
Structured questionnaire survey (OASIS fr OASIS En)	Hendrikx et al., 2011	Allows to identify targeted corrective actions	Scoring. Not a real measure of timeliness. Based on pre-defined requirement criteria which may not apply to all cases.