

Attributes applied to evaluate surveillance systems

Class of attributes	Attributes	N. of surveillance systems	References	Definition	Assessment methods
Organization	<i>Field institutional organization</i>	3	(Amat et al., 2015)	Existence of formalized intermediate units throughout the territory with an active role in system operations, and exhaustiveness or representativeness of coverage of the target population by field agents (Hendrikx et al., 2011).	Experts' assessment using the OASIS scoring grid (Amat et al., 2015).
	<i>Laboratory</i>	3	(Amat et al., 2015)	Effective integration of the laboratory into the surveillance system, use of quality assurance in laboratory analysis, standardization of work quality across laboratories, relevance, sensitivity, and specificity of laboratory techniques, and quality of returned results (Hendrikx et al., 2011).	Experts' assessment using the OASIS scoring grid (Amat et al., 2015).
	<i>Suitability of the system objectives/ Objectives and scope of surveillance</i>	4	(Amat et al., 2015; Rivers et al., 2023)	Relevance and completeness of surveillance systems' objectives, consideration of partners' expectations and consistency of diseases under surveillance with the health situation (Hendrikx et al., 2011; Rivers et al., 2023).	Literature review and engagement of stakeholders (Rivers et al., 2023). Experts' assessment using the OASIS scoring grid (Amat et al., 2015).
	<i>Surveillance planning</i>	1	(Ohashi et al., 2010)	Readiness of basic data and creation of the surveillance plan (Ohashi et al., 2010).	Analytic hierarchy process (Ohashi et al., 2010).
	<i>Systemic organization/ central institutional organization</i>	12	(Amat et al., 2015; Fonseca et al., 2018; Garcia-Vozmediano et al., 2022; Peyre et al., 2015)	An assessment of the organisational structures, management and/or leadership of the system (Fonseca et al., 2018; Garcia-Vozmediano et al., 2022; Peyre et al., 2015).	Descriptive and qualitative assessment combined with a semi-quantitative scoring (Fonseca et al., 2018; Garcia-Vozmediano et al., 2022). System action model (Peyre et al., 2015). Experts' assessment using the OASIS scoring grid (Amat et al., 2015).

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Implementation	<i>Acceptability</i>	35	(Alemu et al., 2019; Amat et al., 2015; Ario et al., 2022; Awekeya et al., 2021; Ba et al., 2024; Babaie et al., 2015; Calba et al., 2016, 2015; Debnath and Ponnaiah, 2018; Grills et al., 2010; Hunduma and Leulseged, 2021; Kuye et al., 2024; Litzroth et al., 2015; Lopes et al., 2016; Maponga et al., 2014; Mremi et al., 2023; Ng'etich et al., 2021; Peyre et al., 2015; Pham et al., 2021; Prajapati et al., 2023; Qurat ul Ain et al., 2019; Rumunu et al., 2022; Schulz et al., 2017, 2016; Schwind et al., 2014; Stewart et al., 2019; Tom-Aba et al., 2018; Umeozuru et al., 2022; Van Boetzelaer et al., 2020; Waziri et al., 2014)	The willingness of persons and organizations to participate in the surveillance system, and the degree to which each of these users is involved in the surveillance (Hoinville et al., 2013).	Assessing the perspectives of the surveillance system's stakeholders and actors through interviews, questionnaires, surveys, or participatory approaches (Awekeya et al., 2021; Calba et al., 2015; Schulz et al., 2016). It may also involve an assessment of participation based on document reviews (Grills et al., 2010; Qurat ul Ain et al., 2019).
	<i>Appropriateness of test method</i>	1	(Ohashi et al., 2010)	Sampling method, screening test method (field level), diagnosis method (reference laboratory) and inspection accuracy (Ohashi et al., 2010).	Analytic hierarchy process (Ohashi et al., 2010).
	<i>Availability and sustainability</i>	1	(Peyre et al., 2015)	The ability of the system to be operational when needed (Peyre et al., 2015).	n.s.*
	<i>Completeness</i>	27	(Alemu et al., 2019; Barboza et al., 2013; Drewe et al., 2017; El-Khatib et al., 2018; Hunduma and Leulseged, 2021; Mala et al., 2021; Mremi et al., 2023; Mtema et al., 2016; Ng'etich et al., 2021; Randriamiarana et al., 2018; Sickbert-Bennett et al., 2011; Sparrow et al., 2016)	The “exhaustivity” of information collected within the surveillance system, often referring to the proportion of reports submitted, or data intended to be collected (Alemu et al., 2019; Barboza et al., 2013; Drewe et al., 2017).	Assessment of the proportion of reports submitted, often compared with the expected number of submissions (El-Khatib et al., 2018; Mala et al., 2021; Sparrow et al., 2016).

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	<i>Coordination</i>	3	(Amat et al., 2015)	Coordination and supervision of the surveillance network (Hendrikx et al., 2011).	Experts' assessment using the OASIS scoring grid (Amat et al., 2015).
	<i>Compliance with related systems</i>	1	(Ohashi et al., 2010)	Development of laws, providing education to those involved in the surveillance system, monitoring of a supplementary system related to surveillance, compensation, measures to deal with non-compliance, and information disclosure (Ohashi et al., 2010).	Analytic hierarchy process (Ohashi et al., 2010).
	<i>Data analysis</i>	3	(Amat et al., 2015)	Completion of comprehensive descriptive data analysis and assessment of the suitability of data for epidemiological analysis (Amat et al., 2015).	Experts' assessment using the OASIS scoring grid (Amat et al., 2015).
	<i>Data collection</i>	4	(Amat et al., 2015; Drewe et al., 2017)	The use of appropriate data sources and collection methods, and the existence of case definition and a data collection protocol (Drewe et al., 2017).	Assessment of the case definition, data collection protocols, and quality assurance mechanisms; identification of data collected but not used for analysis or interpretation and of unmet information needs where data are not currently collected but could feasibly be obtained (Drewe et al., 2017). Experts' assessment using the OASIS scoring grid (Amat et al., 2015).
	<i>Data management</i>	4	(Amat et al., 2015; Drewe et al., 2017)	Appropriate structure and documentation of data management systems for processing information. This includes defined data processing protocols, effective data verification procedures, adequate material and financial resources, and the availability of qualified personnel. (Drewe et al., 2017; Hendrikx et al., 2011).	Consideration of whether the database structure is appropriately designed, whether data documentation is sufficient to support interpretation and understanding, and whether adequate protocols are in place to ensure data quality and security (Drewe et al., 2017).

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					Experts' assessment using the OASIS scoring grid (Amat et al., 2015).
	Data quality	30	(Adokiya et al., 2015; Alemu et al., 2019; Ario et al., 2022; Awekeya et al., 2021; Ba et al., 2024; Babaie et al., 2015; Garcell et al., 2014; Grills et al., 2010; Hunduma and Leulseged, 2021; Kuye et al., 2024; Litzroth et al., 2015; Lopes et al., 2016; Maponga et al., 2014; Mor et al., 2014; Mtema et al., 2016; Ng'etich et al., 2021; Pham et al., 2021; Prajapati et al., 2023; Qurat ul Ain et al., 2019; Randriamiarana et al., 2018; Rumunu et al., 2022; Stolka et al., 2018; Thomas et al., 2018; Umeozuru et al., 2022; Waziri et al., 2014)	The completeness and validity of the data recorded in the surveillance system (German et al., 2001).	Review of surveillance reports, frequently supplemented with data analysis or interviews with key informants (Adokiya et al., 2015; Alemu et al., 2019).
	Detection fraction	1	(Peyre et al., 2015)	n.s.	Case finding capacity (Peyre et al., 2015).
	Evaluation and performance indicators	3	(Amat et al., 2015)	System performance indicators developed and validated by system managers, regularly calculated, interpreted, and disseminated, along with the implementation of external evaluations and corrective measures following those evaluations (Hendrikx et al., 2011).	Experts' assessment using the OASIS scoring grid (Amat et al., 2015).
	Execution of surveillance	1	(Ohashi et al., 2010)	Sampling system and accuracy of individual animal identification data (Ohashi et al., 2010).	Analytic hierarchy process (Ohashi et al., 2010).

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	<i>Feasibility</i>	1	(Stewart et al., 2019)	The time spent following up on surveillance alerts (Stewart et al., 2019).	Interviews with relevant surveillance actors (Stewart et al., 2019).
	<i>Flexibility</i>	35	(Alemu et al., 2019; Amat et al., 2015; Ario et al., 2022; Awekeya et al., 2021; Babaie et al., 2015; Barboza et al., 2013; Hunduma and Leulseged, 2021; Lopes et al., 2016; Maponga et al., 2014; Mremi et al., 2023; Ng'etich et al., 2021; Pham et al., 2021; Prajapati et al., 2023; Qurat ul Ain et al., 2019; Rivers et al., 2023; Rumunu et al., 2022; Schwind et al., 2014; Thomas et al., 2018; Umeozuru et al., 2022; Van Boetzelaer et al., 2020; Waziri et al., 2014)	The ability of a surveillance system to adapt to changing information needs or operating conditions with little additional time, personnel, or allocated funds (German et al., 2001).	Assessing the perspectives of the surveillance system's stakeholders and key informants through interviews or questionnaires (Alemu et al., 2019; Hunduma and Leulseged, 2021). Conducting direct observation of documentation, monitoring system performance, and assessing the system's responsiveness to new demands (Ario et al., 2022; Babaie et al., 2015; Van Boetzelaer et al., 2020).
	<i>Group subject to inspection</i>	1	(Ohashi et al., 2010)	Objectivity of target group and objectivity of clinical diagnosis (Ohashi et al., 2010).	Analytic hierarchy process (Ohashi et al., 2010).
	<i>Minimum sample size</i>	1	(Rivers et al., 2023)	The minimum sample size required to detect hazard at a set design prevalence and confidence level (Rivers et al., 2023).	EpiTools calculator (Rivers et al., 2023).
	<i>Participation</i>	1	(Drewe et al., 2017)	A description of the extent to which people in each of the user groups previously identified get involved in the surveillance process (Drewe et al., 2017). Defined as <i>acceptability</i> in Buehler et al., 2004 (Buehler et al., 2004).	Examining the involvement or engagement of stakeholders in the planning, design and implementation of the surveillance activity (Drewe et al., 2017).
	<i>Reliability</i>	3	(Amat et al., 2015)	n.s.	Experts' assessment using the OASIS scoring grid (Amat et al., 2015).
	<i>Robustness</i>	1	(Porcu et al., 2023)	The repeatability of the procedures (Porcu et al., 2023).	Sensitivity analyses (Porcu et al., 2023).

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	<i>Simplicity</i>	50	(Alemu et al., 2019; Amat et al., 2015; Ario et al., 2022; Awekeya et al., 2021; Ba et al., 2024; Babaie et al., 2015; Barboza et al., 2013; Debnath and Ponnaiah, 2018; Grills et al., 2010; Hunduma and Leulseged, 2021; Kuye et al., 2024; Litzroth et al., 2015; Lopes et al., 2016; Mala et al., 2021; Maponga et al., 2014; Mremi et al., 2023; Ng'etich et al., 2021; Peyre et al., 2015; Pham et al., 2021; Prajapati et al., 2023; Qurat ul Ain et al., 2019; Randriamiarana et al., 2018; Rumunu et al., 2022; Schwind et al., 2014; Thomas et al., 2018; Tom-Aba et al., 2018; Umeozuru et al., 2022; Van Boetzelaer et al., 2020; Waziri et al., 2014)	The structure of the surveillance system and ease of operation (German et al., 2001).	Assessing the perspectives of surveillance system's stakeholders and key informants through interviews or questionnaires (Kuye et al., 2024; Maponga et al., 2014). It could also include an assessment of the system's operations (Grills et al., 2010; Lopes et al., 2016; Waziri et al., 2014).
	<i>Stability</i>	21	(Alemu et al., 2019; Amat et al., 2015; Ario et al., 2022; Awekeya et al., 2021; Babaie et al., 2015; Hunduma and Leulseged, 2021; Lopes et al., 2016; Maponga et al., 2014; Mremi et al., 2023; Ng'etich et al., 2021; Pham et al., 2021; Prajapati et al., 2023; Qurat ul Ain et al., 2019; Rumunu et al., 2022; Schwind et al., 2014; Umeozuru et al., 2022; Van Boetzelaer et al., 2020; Waziri et al., 2014)	The reliability (i.e., the ability to collect, manage, and provide data properly without failure) and availability (the ability to be operational when it is needed) of the surveillance system (German et al., 2001).	Assessing the perspectives of surveillance system's stakeholders and key informants through interviews or questionnaire (Awekeya et al., 2021; Pham et al., 2021). Assessment of resources' availability (forms, guidelines and staff) (Lopes et al., 2016; Maponga et al., 2014; Van Boetzelaer et al., 2020).
	<i>Stakeholder analysis</i>	1	(Rivers et al., 2023)	Interest and influence of stakeholders in the system (Rivers et al., 2023).	Modified Mendelov Matrix and structured interviews to stakeholders (Rivers et al., 2023).

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	<i>Supervision and feedback</i>	1	(Rumunu et al., 2022)	The extent and frequency of supervision by higher-level authorities, along with the provision of feedback to the reporting sites (Rumunu et al., 2022).	Survey administered to stakeholders and review of documents (Rumunu et al., 2022).
	<i>Surveillance procedures</i>	3	(Amat et al., 2015)	Existence of surveillance procedures that are relevant to the system's objectives and generate comprehensive, representative results (Hendriks et al., 2011).	Experts' assessment using the OASIS scoring grid (Amat et al., 2015).
	<i>Surveillance tools</i>	3	(Amat et al., 2015)	Existence of formalized surveillance protocols, standardization and quality of data and collected samples, relevance of measurement tools (excluding laboratory tools), quality of case definitions and reporting procedures, respect of the time period between notification of case and returned result and acceptability of the system to data sources or collectors (Hendriks et al., 2011).	Experts' assessment using the OASIS scoring grid (Amat et al., 2015).
	<i>Technological evaluation</i>	1	(Randriamiarana et al., 2018)	Availability of the technology required to perform surveillance activities (Randriamiarana et al., 2018).	Interviews with stakeholders and evaluation of technological equipment availability, origin, replacement possibilities, and the competency of health facility staff in its use (Randriamiarana et al., 2018).
	<i>Training</i>	4	(Amat et al., 2015; Rumunu et al., 2022)	The nature (objectives and content) and duration of training provided to surveillance actors, the proportion of surveillance actors who have been trained, and the adequacy of human, material, and financial resources available for training (Hendriks et al., 2011; Rumunu et al., 2022).	Survey administered to stakeholders and review of documents (Rumunu et al., 2022). Experts' assessment using the OASIS scoring grid (Amat et al., 2015).

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	<i>True prevalence</i>	1	(Rivers et al., 2023)	Estimation of the true prevalence of a disease to confirm or revise prior estimates of apparent prevalence, and to evaluate whether the choice of design prevalence for the system is still appropriate (Rivers et al., 2023).	EpiTools calculator (Rivers et al., 2023).
	<i>Usability</i>	1	(El-Khatib et al., 2018)	The ease of use, usefulness, and efficiency of the surveillance system's platform (El-Khatib et al., 2018).	Questionnaire administered in the surveillance focal points (El-Khatib et al., 2018).
Performance	<i>Area specificity</i>	1	(Bellini et al., 2014)	The capacity of the surveillance to indicate the spatial distribution of risk of a disease in a different host population (Bellini et al., 2014).	Linear regression analysis (Bellini et al., 2014).
	<i>Communication</i>	5	(Amat et al., 2015; Drewe et al., 2017; Hunduma and Leulseged, 2021)	An evaluation of how information is shared focusing on the methods, communication channels, ease, and timeliness across all levels of the surveillance system, including an assessment of the information provided, the outputs and a description of the efforts made to disseminate the surveillance information (Drewe et al., 2017; Hunduma and Leulseged, 2021).	Assessment of surveillance data outputs, including their quality, the frequency of their production, and the extent to which they are accessible to all relevant stakeholders (Drewe et al., 2017). Experts' assessment using the OASIS scoring grid (Amat et al., 2015).
	<i>Coverage</i>	13	(Drewe et al., 2017; Ely et al., 2012; Mala et al., 2021; Mercier et al., 2020; Peyre et al., 2015; Vredenberg et al., 2022)	The proportion of the target population included in the surveillance system (Ely et al., 2012).	Assessment of the proportion of population coverage (Mala et al., 2021). The sampled and target population should be at least characterised and compared qualitatively (Drewe et al., 2017).
	<i>Early detection capacity</i>	2	(Bellini et al., 2014; Chaintoutis et al., 2014)	The ability to detect the circulation of a disease prior to its transmission to a different host population (Bellini et al., 2014; Chaintoutis et al., 2014).	Linear regression analysis (Bellini et al., 2014). Poisson regression model (Chaintoutis et al., 2014).

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	<i>Effectiveness</i>	1	(Häsler et al., 2012b)	The extent to which a given technical objective, or target, is achieved (Häsler et al., 2012b).	Qualitative risk assessment to define the differences in defined probabilities between a scenario with surveillance and a scenario without surveillance (Häsler et al., 2012b).
	<i>Effectiveness of outbreak detection</i>	1	(Comin et al., 2012)	The estimated average number of outbreaks caused by a single infected epidemiological unit (Comin et al., 2012).	R_h calculation (Comin et al., 2012).
	<i>Efficiency</i>	3	(Collineau et al., 2013; Gervasi et al., 2020; Mercier et al., 2020)	The effectiveness of the surveillance system in reducing the occurrence of the disease by optimizing the financial, human and material resources deployed (Collineau et al., 2013).	Feedback loop analysis (Collineau et al., 2013). Deterministic Susceptible-Infected-Recovered Model (Gervasi et al., 2020).
	<i>False negative</i>	2	(Foddai et al., 2021; Porcu et al., 2023)	The likelihood of the system to fail in detecting true events (Foddai et al., 2021; Porcu et al., 2023).	One minus the negative predictive value (NPV) of the absence of a significant outlier occurrence (Porcu et al., 2023). $FN = TI * (1 - HSe)$, where FN is the number of false negative herds, TI is the expected number of “truly” infected herds, and $(1 - HSe)$ is the probability that a TI was “wrongly” classified as negative (Foddai et al., 2021).
	<i>False positive</i>	2	(Attema et al., 2019; Foddai et al., 2021)	The likelihood of the system to incorrectly identify a positive case (Attema et al., 2019; Foddai et al., 2021).	Prospect theory (Attema et al., 2019). $FP = TF * (1 - HSp)$, where FP is the number of false positive herds, TF is the number of “truly free” herds, and $(1 - HSp)$ is the probability that a TF was wrongly classified as positive (Foddai et al., 2021).
	<i>Information distribution</i>	3	(Amat et al., 2015)	External communication and systematic dissemination of surveillance reports (Amat et al., 2015).	Experts’ assessment using the OASIS scoring grid (Amat et al., 2015).

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	Negative predictive value (NPV)	3	(Faverjon et al., 2019; Foddai et al., 2021; Jamin and Rivière, 2020)	The probability that a negative test result accurately indicates the absence of the condition in an individual or group (Jamin and Rivière, 2020).	Scenario tree model (Jamin and Rivière, 2020; Martin et al., 2007a). $NPV = TN / (TN + FN)$, where TN=True Negative, FN= False Negative (Faverjon et al., 2019). $NPV = [HSp \times (1 - EPI_H)] / [HSp \times (1 - EPI_H) + (1 - HSe) \times EPI_H]$, where HSp= herd specificity and EPI_H = the median effective probability of herd infection within the risk stratum (Foddai et al., 2021).
	Positive predictive value (PPV)	21	(Alemu et al., 2019; Ario et al., 2022; Awekeya et al., 2021; Debnath and Ponnaiah, 2018; Faverjon et al., 2019; Foddai et al., 2021; Hunduma and Leulseged, 2021; Jamin and Rivière, 2020; Lopes et al., 2016; Porcu et al., 2023; Qurat ul Ain et al., 2019; Ratnayake et al., 2016; Thomas et al., 2018; Umeozuru et al., 2022; Van Boetzelaer et al., 2020; Waziri et al., 2014)	The proportion of reported cases that actually have the health-related event under surveillance (German et al., 2001).	$PVP = TP / (TP + FP)$, where TP=True Positive, FP=False Positive (Alemu et al., 2019; Awekeya et al., 2021). $PPV = [HSe \times EPI_H] / [(HSe \times EPI_H) + (1 - EPI_H) \times (1 - HSp)]$, where HSe= herd sensitivity and EPI_H = the median effective probability of herd infection within the risk stratum (Foddai et al., 2021). Scenario tree model (Jamin and Rivière, 2020; Martin et al., 2007a).
	Timeliness	74	(Alemu et al., 2019; Amat et al., 2015; Ario et al., 2022; Arruda et al., 2017; Attema et al., 2019; Awekeya et al., 2021; Ba et al., 2024; Babaie et al., 2015; Barboza et al., 2013; Coelho et al., 2024; Colón-González et al., 2018; Debnath and Ponnaiah, 2018; Drewe et al., 2017; El-Khatib et al., 2018; Faverjon et al., 2019, 2017; Ferrer-Miranda et al., 2022, 2020; Garcell et al., 2014; Grills et al., 2010;	The speed between steps in a public health surveillance system (German et al., 2001).	Calculation of time intervals between two steps of the surveillance system (Garcell et al., 2014; Liu et al., 2021; Lokuge et al., 2022). Calculation of surveillance reports submitted on time (Alemu et al., 2019; Lopes et al., 2016). Assessing the perspectives of surveillance system's stakeholders and key informants through interviews or questionnaires (Awekeya et al., 2021). Kaplan-Meier survival analysis (Arruda et al., 2017).

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			Hunduma and Leulseged, 2021; Kuye et al., 2024; Liu et al., 2021; Lokuge et al., 2022; Lopes et al., 2016; Mala et al., 2021; Maponga et al., 2014; Martin et al., 2015; Mremi et al., 2023; Mtema et al., 2016; Nathues et al., 2015; Ng’etich et al., 2021; Olu et al., 2020; Peyre et al., 2015; Pham et al., 2021; Porcu et al., 2023; Prajapati et al., 2023; Qurat ul Ain et al., 2019; Randriamiarana et al., 2018; Ratnayake et al., 2016; Reijn et al., 2011; Rossi et al., 2015; Schulz et al., 2017; Schwind et al., 2014; Sparrow et al., 2016; Stolka et al., 2018; Thomas et al., 2018; Umeozuru et al., 2022; Van Boetzelaer et al., 2020; Vredenberg et al., 2024; Waziri et al., 2014)		Capture-recapture method (Peyre et al., 2015). Different quantitative models, including (but not limited to): logistic and negative binomial regressions (Coelho et al., 2024), generalized linear model (Ferrer-Miranda et al., 2020), detection algorithm (Colón-González et al., 2018), cox proportional hazards model (Vredenberg et al., 2024), stochastic network model (Rossi et al., 2015). Experts’ assessment using the OASIS scoring grid (Amat et al., 2015).
	<i>Type I error or False alarm rate</i>	5	(Grosbois et al., 2015; Jamin and Rivière, 2020; Vial et al., 2016)	The probability of a non-infectious unit or population being classified as infected (Grosbois et al., 2015; Jamin and Rivière, 2020).	$P(A+ S-)$, where $A+$ is the subset for which the focal epidemiological state variable is assessed as falling into the category requiring the implementation of intervention measures, $S-$ is the subset of values of the state variable that requires no intervention (Grosbois et al., 2015). Scenario tree model (Jamin and Rivière, 2020; Martin et al., 2007a). Improved Farrington algorithm (Vial et al., 2016).
	<i>Type II error</i>	4	(Grosbois et al., 2015; Jamin and Rivière, 2020)	The probability of an infectious unit or population being classified as non-infected	$P(A- S+)$, where $A-$ is the subset for which the focal epidemiological state variable is assessed as falling into the

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				(Grosbois et al., 2015; Jamin and Rivière, 2020).	category requiring no intervention measure, S+ is the subset of values of the state variable that requires the implementation of intervention measures (Grosbois et al., 2015). Scenario tree model (Jamin and Rivière, 2020; Martin et al., 2007a).
	Precision	1	(Peyre et al., 2019)	How closely defined a numerical estimate is (Peyre et al., 2019).	n.s.
	Procedure	1	(Hunduma and Leulseged, 2021)	The ability to carry out the operations required by the surveillance system (Hunduma and Leulseged, 2021).	Questionnaire administered to relevant stakeholders (Hunduma and Leulseged, 2021).
	Representativeness	33	(Alemu et al., 2019; Amat et al., 2015; Ario et al., 2022; Awekeya et al., 2021; Babaie et al., 2015; Barboza et al., 2013; Debnath and Ponnaiah, 2018; Ely et al., 2012; Hunduma and Leulseged, 2021; Lopes et al., 2016; Maponga et al., 2014; Mremi et al., 2023; Prajapati et al., 2023; Qurat ul Ain et al., 2019; Rumunu et al., 2022; Thomas et al., 2018; Umeozuru et al., 2022; Van Boetzelaer et al., 2020; Vredenberg et al., 2022)	The ability of the system to accurately describe the occurrence of a health-related event over time and its distribution in the population by place and person (German et al., 2001).	Assessing the perspectives of surveillance system's stakeholders and key informants through interviews or questionnaires, often associated with a review of documents (Awekeya et al., 2021; Maponga et al., 2014; Qurat ul Ain et al., 2019; Rumunu et al., 2022). Analysis of both geographical distribution and the inclusiveness of different population subgroups (Babaie et al., 2015; Ely et al., 2012; Hunduma and Leulseged, 2021; Mremi et al., 2023).
	Response rate	1	(Stephenson et al., 2016)	The average rate at which users respond to the system's notifications (Stephenson et al., 2016).	Data analysis (Stephenson et al., 2016).
	Sensitivity	82	(Alba et al., 2010; Alemu et al., 2019; Amat et al., 2015; Ario et al., 2022; Arruda et al., 2017; Awekeya et al., 2021; Barboza et	- The proportion of individuals in the population of interest that have the health-related condition of interest that the surveillance system is able to detect;	Scenario tree model (Alba et al., 2010; Calero and Monti, 2022; Calvo-Artavia et al., 2013; Christensen et al., 2011; Craighead et al., 2015; El Allaki et al.,

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			al., 2014, 2013; Bonney et al., 2019; Breed et al., 2012; Calero and Monti, 2022; Calvo-Artavia et al., 2013; Cameron et al., 2020; Chenais et al., 2015; Christensen et al., 2011; Colón-González et al., 2018; Comin et al., 2012; Craighead et al., 2015; Drewe et al., 2017; El Allaki et al., 2016; Faverjon et al., 2019, 2017, 2016; Foddai et al., 2021, 2020; Gerardo-Giorda et al., 2013; Grills et al., 2010; Guétin-Poirier et al., 2020; Guo et al., 2014; Hénaux and Calavas, 2017; Hernández-Jover et al., 2011; Knight-Jones et al., 2010; Liu et al., 2021; Lokuge et al., 2022; Lopes et al., 2016; Maponga et al., 2014; Martin et al., 2015; Mremi et al., 2023; Mtema et al., 2016; Nathues et al., 2015; Norström et al., 2014; Peyre et al., 2015; Poirier et al., 2019; Pozo et al., 2021; Qurat ul Ain et al., 2019; Ratnayake et al., 2016; Reber et al., 2012; Rivière et al., 2015; Rossi et al., 2015; Rüegg et al., 2018; Rutten et al., 2012; Schulz et al., 2017; Sergeant et al., 2017; Umeozuru et al., 2022; Veldhuis et al., 2017; Vial et al., 2016; Vredenberg et al., 2024; Waziri et al., 2014; Weaver et al., 2016; Welby et al., 2013, 2012)	- The probability of detecting a significant increase in the level of a disease that is not currently present in the population or the occurrence of any cases of disease not currently present; - The probability to detect at least one case if the disease is present at a predefined design prevalence (Martin et al., 2007b; Peyre et al., 2019).	2016; Guétin-Poirier et al., 2022; Hénaux and Calavas, 2017; Hernández-Jover et al., 2011; Knight-Jones et al., 2010; Nathues et al., 2015; Norström et al., 2014; Peyre et al., 2015; Poirier et al., 2019; Rivière et al., 2015; Rüegg et al., 2018; Rutten et al., 2012; Veldhuis et al., 2017; Welby et al., 2013, 2012). Sensitivity=TP/(TP+FN), where TP=True Positive and FN=False Negative (Barboza et al., 2013; Waziri et al., 2014). Early detection surveillance sensitivity= population coverage × temporal coverage × detection sensitivity (Cameron et al., 2020). Simulation models (Bonney et al., 2019; Foddai et al., 2021, 2020; Schulz et al., 2017; Sergeant et al., 2017; Weaver et al., 2016). Stochastic agent-based model (Arruda et al., 2017). Stochastic susceptible-exposed-infectious-recovered/removed (SEIR) model (Comin et al., 2012; Gerardo-Giorda et al., 2013). Receiver Operating Characteristic (ROC) curve analysis (Faverjon et al., 2017, 2016). Experts' assessment using the OASIS scoring grid (Amat et al., 2015).

Class of attributes	Attributes	N. of surveillance systems	References	Definition	Assessment methods
	<i>Specificity</i>	8	(Amat et al., 2015; Drewe et al., 2017; Faverjon et al., 2019, 2017, 2016; Foddai et al., 2021)	The proportion of true non-events correctly classified as such (Drewe et al., 2017).	$Sp = TN / (TN + FP)$, where TN=True Negative and FP=False Positive (Faverjon et al., 2019). Deterministic simulation model (Foddai et al., 2021). Receiver Operating Characteristics (ROC) curve analysis (Faverjon et al., 2017). Experts' assessment using the OASIS scoring grid (Amat et al., 2015).
Impact	<i>Benefit</i>	7	(Babo Martins et al., 2017; Calba et al., 2015; Delabougliise et al., 2016; Drewe et al., 2017; Guo et al., 2014; Häslér et al., 2012a, 2012c)	Direct and indirect advantages produced by the surveillance system (Drewe et al., 2017).	Identification of both direct and indirect benefits (Babo Martins et al., 2017; Drewe et al., 2017). Interviews with relevant actors, using also participatory approaches (Calba et al., 2015; Delabougliise et al., 2016). Economic model (Häslér et al., 2012a, 2012c).
	<i>Cost or cost-effectiveness</i>	30	(Awekeya et al., 2021; Babo Martins et al., 2017; Bellini et al., 2014; Delabougliise et al., 2016; Drewe et al., 2017; El-Khatib et al., 2018; Guétin-Poirier et al., 2020; Guo et al., 2014; Häslér et al., 2012c, 2012a, 2012b; Hénaux and Calavas, 2017; Knight-Jones et al., 2010; Maponga et al., 2014; Mtema et al., 2016; Nathues et al., 2015; Peyre et al., 2015; Poirier et al., 2019; Reber et al., 2012; Rivers et al., 2023; Rivière et al., 2017; Rüegg et al., 2018; Rutten et al., 2012; Schulz et al., 2017; Stephenson et al., 2016; Undurraga et al., 2017; Veldhuis et al., 2017)	The expenses associated with surveillance activities (Häslér et al., 2012c). Cost-effectiveness: ratio of the direct cost of a surveillance system component to the sensitivity (Knight-Jones et al., 2010).	Cost estimation or cost analysis (Awekeya et al., 2021; Babo Martins et al., 2017). Economic model (Häslér et al., 2012a, 2012c). Cost-effectiveness analysis (Poirier et al., 2019; Rivers et al., 2023; Undurraga et al., 2017). Scenario tree model (Hénaux and Calavas, 2017; Rivière et al., 2017). Cost minimization analysis (Bellini et al., 2014). Interviews with relevant actors using participatory approaches (Delabougliise et al., 2016).

Class of attributes	Attributes	N. of surveillance systems	References	Definition	Assessment methods
	<i>Impact</i>	1	(Drewe et al., 2017)	A measure of the usefulness of the surveillance system. Should include details of actions taken as a result of the information provided by the surveillance system (Drewe et al., 2017).	Assessing how effectively the surveillance system meets policy and industry needs by evaluating its influence on decision-making, policy development, disease prioritization, and control measures, as well as the relevance, use, and reception of its outputs (Drewe et al., 2017).
	<i>Margin over intervention</i>	2	(Häsler et al., 2012c, 2012a)	The maximum expenditures potentially available for surveillance without the net benefits from mitigation overall becoming zero (Häsler et al., 2012a).	Economic model (Häsler et al., 2012a, 2012c).
	<i>Net value of the programme</i>	2	(Häsler et al., 2012a, 2012c)	The overall net value of surveillance and intervention (Häsler et al., 2012a).	Economic model (Häsler et al., 2012a, 2012c).
	<i>Usefulness</i>	35	(Alemu et al., 2019; Amat et al., 2015; Ba et al., 2024; Babaie et al., 2015; Barboza et al., 2013; Debnath and Ponnaiah, 2018; Hunduma and Leulseged, 2021; Kuye et al., 2024; Lopes et al., 2016; Maponga et al., 2014; Mremi et al., 2023; Ng'etich et al., 2021; Pham et al., 2021; Prajapati et al., 2023; Qurat ul Ain et al., 2019; Rumunu et al., 2022; Schwind et al., 2014; Thomas et al., 2018; Tom-Aba et al., 2018; Umeozuru et al., 2022; Van Boetzelaer et al., 2020)	The ability of a surveillance system to contribute to the prevention and control of adverse health-related events, meeting the objectives for which it was designed. Usefulness might be affected by all the attributes of a system (German et al., 2001; WHO Regional Office for the Eastern Mediterranean, 2018).	Assessing the perspectives of surveillance system's stakeholders and key informants through interviews or questionnaires, often associated with a review of documents (Alemu et al., 2019; Hunduma and Leulseged, 2021; Prajapati et al., 2023).
One Health approach	<i>OH learning</i>	4	(Fonseca et al., 2018; Garcia-Vozmediano et al., 2022)	Examines knowledge exchange infrastructure and how this supports learning within the system and in the broader environment (Garcia-Vozmediano et al., 2022).	Descriptive and qualitative assessment combined with a semi-quantitative scoring (Fonseca et al., 2018; Garcia-Vozmediano et al., 2022).

Class of attributes	Attributes	N. of surveillance systems	References	Definition	Assessment methods
	<i>OH planning</i>	4	(Fonseca et al., 2018; Garcia-Vozmediano et al., 2022)	The planning and resource allocation in the Initiative (Fonseca et al., 2018).	Descriptive and qualitative assessment combined with a semi-quantitative scoring (Fonseca et al., 2018; Garcia-Vozmediano et al., 2022).
	<i>OH sharing</i>	4	(Fonseca et al., 2018; Garcia-Vozmediano et al., 2022)	The extent and methods of information and data sharing infrastructures in One Health Initiatives (Fonseca et al., 2018).	Descriptive and qualitative assessment combined with a semi-quantitative scoring (Fonseca et al., 2018; Garcia-Vozmediano et al., 2022).
	<i>OH thinking</i>	4	(Fonseca et al., 2018; Garcia-Vozmediano et al., 2022)	The specific dimensions and scales involved and/or affected by the health issue, and how they match within the implemented initiative (Garcia-Vozmediano et al., 2022).	Descriptive and qualitative assessment combined with a semi-quantitative scoring (Fonseca et al., 2018; Garcia-Vozmediano et al., 2022).
	<i>OH working</i>	4	(Fonseca et al., 2018; Garcia-Vozmediano et al., 2022)	Interdisciplinary and participatory engagement in One Health initiatives (Fonseca et al., 2018).	Descriptive and qualitative assessment combined with a semi-quantitative scoring (Fonseca et al., 2018; Garcia-Vozmediano et al., 2022).

n.s.* = not specified.

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