



Food and Agriculture
Organization of the
United Nations



World Health
Organization

Joint FAO/WHO Expert Meetings on Microbiological Risk Assessment (JEMRA)

CALL FOR DATA ON VEROTOXIGENIC *ESCHERICHIA COLI* (VTEC) / SHIGATOXIGENIC *E. COLI* (STEC)

Deadline: 17 June 2016

Background

Verotoxigenic *Escherichia coli* (VTEC) / Shiga toxigenic *E. coli* (STEC)¹ are an important cause of foodborne disease. Infections have been associated with a wide range of symptoms from mild intestinal discomfort to haemolytic uremic syndrome (HUS), end-stage renal disease (ESRD) and death. The global incidence of VTEC-/STEC-related disease has been estimated to be 2,801,000 acute illnesses, 3,890 cases of HUS, 270 cases of permanent ESRD, and 230 deaths annually (Majowicz et al., 2014)². Further information on VTEC/STEC is attached as [Annex 1](#).

VTEC/STEC have been discussed at several recent sessions of the Codex Committee on Food Hygiene (CCFH). At the 45th Session of the CCFH³, Delegations recognised that VTECs/STECs were important pathogens in beef. However, it was not feasible to address them at the same time as non-typhoidal *Salmonella* in beef and pork and therefore they were included in the Forward Workplan of the Committee.

At the 47th Session of the CCFH, held in November 2015, it was agreed that the issue of VTEC/STEC in foods should now be addressed (REP 16/FH, 2015)⁴. To facilitate this new work, the CCFH requested FAO and WHO to develop a report compiling and synthesizing the available relevant information, using existing reviews where possible “to develop a report compiling and synthesizing the information available, using existing reviews, on the following aspects of VTECs/STECs:

1. the global burden of disease attribution based on outbreak data, incorporating information from the FERG as appropriate;
2. hazard identification and characterization of VTEC/STEC, including information on genetic profiles and virulence factors; and

¹ For the purpose of this document VTEC/STEC includes those strains which in addition to the verocytotoxin/shigatoxin producing capacity harbour additional genes that are important in virulence.

² Majowicz SE, Scallan E, Jones-Bitton A, Sargeant JM, Stapleton J, Angulo FJ, Yeung DH, Kirk MD. 2014. Global Incidence of Human Shiga Toxin-Producing *Escherichia coli* Infections and Deaths: A Systematic Review and Knowledge Synthesis. *Foodborne Pathog Dis.* 11(16):447-455. doi:10.1089/fpd.2013.1704.

³ Report of the 45th Session of the CCFH REP14/FH available http://www.fao.org/fao-who-codexalimentarius/download/report/805/REP14_FHe.pdf

⁴ Report of the 47th Session of the CCFH Rep 16/FH available http://www.fao.org/fao-who-codexalimentarius/download/report/931/REP16_FHe.pdf

3. current monitoring and assurance programmes including the status of the currently available methodology (commercially available and validated for regulatory purposes) for monitoring of VTECs/STECs in food as basis for management and control.”

The CCFH noted that to facilitate this work a call for data would need to be issued and feedback from countries would be critical. The CCFH also noted that the nature and content of the work to be undertaken by CCFH, including the commodities to be focused on, would be determined based on the outputs of the FAO/WHO report.

Objectives

The data will serve as inputs to the development of scientific advice which will guide the elaboration of appropriate Codex texts. This call is supplemental to the earlier call⁵ issued in 2015, and is being issued in response to the identification of the specific interest to the CCFH.

Request for relevant information

FAO and WHO want to ensure that all available and relevant information/data are collected, and are requesting governments, the food industry, academia, consumer groups, laboratories, health care providers and any other interested organizations and individuals to submit any available data on the specific areas indicated. These data may be published or unpublished. Reference should be made to related published studies, where applicable.

Deadline for submission of data

Please submit any relevant information by 17 June 2016 in any format (electronic and/or hard copies - electronic submissions are preferred, either via e-mail (if not too large) or on CD ROM), in any official United Nations (UN) language (English, French, Spanish, Arabic, Chinese, Russian), and with a title and short description of the content in English along with the list of data and information requirements if possible, to jemra@fao.org and jemra@who.int. If information is not available in an official UN languages, a short summary of the nature of the data should be provided, preferably in English.

CALL FOR DATA

In line with the request from the 47th Session of the CCFH⁴, data and information on the following aspects of VTEC/STEC are requested:

1. Data on the incidence of VTEC/STEC disease⁶ including surveillance data and data from specific outbreaks. This could include information on the following for both surveillance and outbreak where known:
 - a. time of year and month outbreak occurred;
 - b. whether the outbreak / cases were confirmed or suspected regarding the link between the food vehicle and the outbreak of human cases and how this was determined (e.g. laboratory confirmation, epidemiological investigation, etc.)
 - c. number of cases, hospitalizations, HUS, ESRD and deaths associated with the outbreaks;

⁵ Call for data and experts on non-typhoidal Salmonella spp. and pathogenic Escherichia coli associated with beef and pork

http://www.fao.org/fileadmin/user_upload/agns/pdf/Call_for_data_experts/Call_for_data_experts_Sal_in_beef_pork_-_Final_Feb_27_clean_EN.pdf

⁶ Data from the report of the WHO estimates of the global burden of foodborne diseases (available at http://www.who.int/foodsafety/areas_work/foodborne-diseases/ferg/en/) will be used to the extent possible. However, they focused on burden at the population level. Therefore, FAO/WHO are particularly interested in receiving data on outbreak related illnesses from any food source. In addition population level illness data, particularly from 2012 onwards, which is not captured in the WHO report would be useful. .

- d. age and sex distribution of cases (e.g. range and median);
- e. individual host susceptibility characteristics of cases (e.g. pregnancy, nutrition, health and medication status, concurrent infections, immune status and previous exposure history or any other risk factors identified);
- f. occurrence and number of secondary and tertiary transmission;
- g. the implicated food (if identified) and attributes of the food that may have been relevant in the occurrence of the outbreak;
- h. level of VTEC/STEC in the food attributed;
- i. strains/serotypes of VTEC/STEC in the food attributed
- j. origin (e.g. local, imported) of the food attributed;
- k. place of exposure;

Further guidance on the type of information to be provided is attached as [Annex 2](#).

2. Any food attribution studies for VTEC/STEC or data that could be used for the purposes of undertaking a food attribution study.

Further guidance on the type of information to be provided is attached as [Annex 3](#).

3. Hazard identification and characterization of VTEC/STEC. Information requested includes:
 - a. characteristics of VTEC/STEC strains identified as the aetiological agents causing foodborne outbreaks
 - i. serotypes
 - ii. virulence profiles (virulence genes and subtypes)
 - iii. genomic types including references to methodology used for typing
 - iv. genopathotype combinations
 - v. antimicrobial resistance profiles
 - vi. qualitative or quantitative description of the severity and duration of illnesses associated with VTEC/STEC strains
 - vii. dose-response assessment if performed on data

Further guidance on the type of information to be provided is as [Annex 4](#).

4. Current monitoring and surveillance as well as commodity specific programmes. Relevant information required includes:

- a. Summary of risk management programs in place for individual commodity groups, and evidence for their success or otherwise;
- b. Description of methodology that is commercially available and validated for use in regulatory monitoring and surveillance as well as commodity specific programs for VTEC/STEC (or their known pathogenicity genes) indicating the specific commodities for which they are used.
- c. Developing or new methodologies which will be shortly available to support surveillance (or may already be available in some countries) as well as comments on limitations in currently available laboratory methods and developments in methods required to monitor VTEC/STEC to cover the variety of commodities included in regulatory controls.

Further guidance on the type of information to be provided is attached as [Annex 5](#).

Confidential and/or unpublished data

FAO and WHO recognize that some of the information and relevant data which are now required may be unpublished or of a confidential nature. With regard to unpublished information and data, this remains the property of the author for subsequent publication by the owner as original material. Unpublished confidential studies that are submitted will be safeguarded in so far as it is possible to do so without compromising the work of FAO and WHO. Specific issues relating to confidentiality should be discussed directly between the information and data owners and FAO/WHO. For these and other issues please contact FAO and WHO at the contacts provided.

Correspondence

For more information, please contact Dr Sarah Cahill (FAO) or Dr Rei Nakagawa (WHO).

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Annex 1: Further information on VTECs/STECs

There are multiple sources of exposure to VTECs/STECs and food is a common vehicle in many countries causing sporadic cases, small clusters, and medium to large scale international outbreaks. A major reservoir of VTEC/STEC strains is ruminant animals and inadequately cooked or processed meat and meat products were initially the major foods attributed in foodborne outbreaks; however, over time a wide variety of food contaminated directly or indirectly from ruminant sources have been attributed as the vehicle of concern in outbreaks including milk and dairy products, fruits, vegetables, nuts, sprouted seeds and other foods.

VTEC/STEC are a complex *Escherichia coli* group. It includes many serotypes of which O157 is probably best known, as it has been the cause of severe foodborne disease. It is the carriage of one or more of the Shiga toxin genes that is a primary characteristic defining this pathogenic *E. coli* group. However, a number of accessory virulence factors, and their association with serotypes, has also been identified and associated with the virulence potential of an isolate. Pathogenicity can neither be excluded nor confirmed for a given VTEC/STEC serogroup or serotype based on the seropathotype concept. It is not possible to fully define human pathogenic VTEC/STEC or identify factors for VTEC/STEC that absolutely predict the potential to cause human disease. Genomic characterisation and whole genome sequencing are providing new insights into the pathogenesis and the identification of key VTEC/STEC of public health significance and knowledge in this area is growing.

Annex 2: Guidance on the type of information to be provided to support work on burden of foodborne VTEC/STEC

#	Questions	1.	2.	3.
Burden				
1.	Have any specific burden of disease studies (burden of illness and/or food attribution) been undertaken in your region/country that consider VTEC/STEC?			
2.	Relevant links (articles, reports, websites etc)			
Questions on the surveillance data				
1.	Name of the outbreak, if any			
2.	Time of year and month outbreak occurred			
3.	Confirmed? Or suspected?			
4.	If confirmed, how was this determined?			
5.	Total number of the cases associated with the outbreak			
6.	Number of hospitalized people			
7.	Number of HUS cases			
8.	Number of ESRD cases			
9.	Number of deaths			
10.	Age and sex distribution of cases			
11.	Individual host susceptibility characteristics			
12.	Occurrence and number of secondary and tertiary transmission			
13.	The implicated food and its attributes, if any			
14.	Level of VTEC/STEC in the food attributed			
15.	Strains of VTEC/STEC in the food attributed			
16.	Place of origin of food attributed			
17.	Place of exposure			
18.	Other info			

Annex 3: Guidance on providing data to support food attribution studies for VTEC/STEC

If some the data is provided in Annex 2, please make reference to which outbreak you are referring to and there is no need to fill in this table.

#	Questions	1.	2.	3.
Animals*				
1.	Prevalence			
2.	Number of Samples			
3.	Number of Positives			
4.	Subtyping information (e.g. serotypes, PFGE, WGSequences)			
5.	Concentration			
Foods*				
1.	Prevalence			
2.	Number of Samples			
3.	Number of Positives			
4.	Subtyping information (e.g. serotypes, PFGE, WGSequences)			
5.	Concentration			
Humans				
1.	Number of Cases (total reported, including cases from all non-foodborne transmissions)			
2.	Number of Outbreak-related cases			
3.	Number of Travel-related cases			
4.	Subtyping information (e.g. serotypes, PFGE, WGSequences)			
Food Consumption				
1.	Amount available/year (Tones)			
2.	Daily consumption/person/day (g)			

*Data should, to the widest extent possible, reflect what the population is exposed to via farm animals, animal food products and, if possible, pets. Representative data should be chosen over amount of data. It is important to avoid clustered data, meaning that a precise and “sensible” definition of epidemiological unit should be established: only one isolate of the same VTEC/STEC type per herd, flock, batch or sample (whichever is the most relevant) should be included. In addition, only the result of one diagnostic submission per human case is to be included. Active surveillance data is preferred to passive surveillance acquired data, and the usage of results from veterinary diagnostic submissions should be avoided.

Annex 4: Guidance on the type of information to be provided to support hazard identification and characterization of VTEC/STEC

#	Questions	1.	2.	3.
1.	What are the most commonly occurring serotypes in your country			
2.	Serotypes in human cases			
3.	Foods (along with other risk factors) with which they are most commonly associated			
4.	Virulence profiles (virulence genes and subtypes)			
5.	Genomic types including references to methodology used for typing			
6.	Genopathotype combinations			
7.	Antimicrobial resistance profiles			
8.	Qualitative or quantitative description of the severity and duration of illnesses			
9.	Dose-response assessment if performed on data			
10.	Other information			
11.	Relevant links (articles, reports, websites etc)			

Annex 5: Guidance on the type of information to be provided on current monitoring and assurance programmes for VTEC/STEC

#	Questions	Answers
1.	Summary of risk management (monitoring/ surveillance, how data is used, actions triggered etc.) programs in place for individual commodities or commodity groups	
2.	Description of methodology that is commercially available and validated for use in regulatory monitoring and surveillance as well as commodity specific programs for VTEC/STEC specifying the specific commodities for which they are used	
3.	Comments on limitations in currently available laboratory methods and developments in methods required to monitor VTEC/STEC to cover the variety of commodities included in regulatory controls.	
4.	Other challenges and limitations linked to surveillance/monitoring programs	
5.	Evidence for the impact of these programs, success or otherwise	
6.	Any other relevant information/comments	
7.	Relevant links (articles, reports, websites etc)	