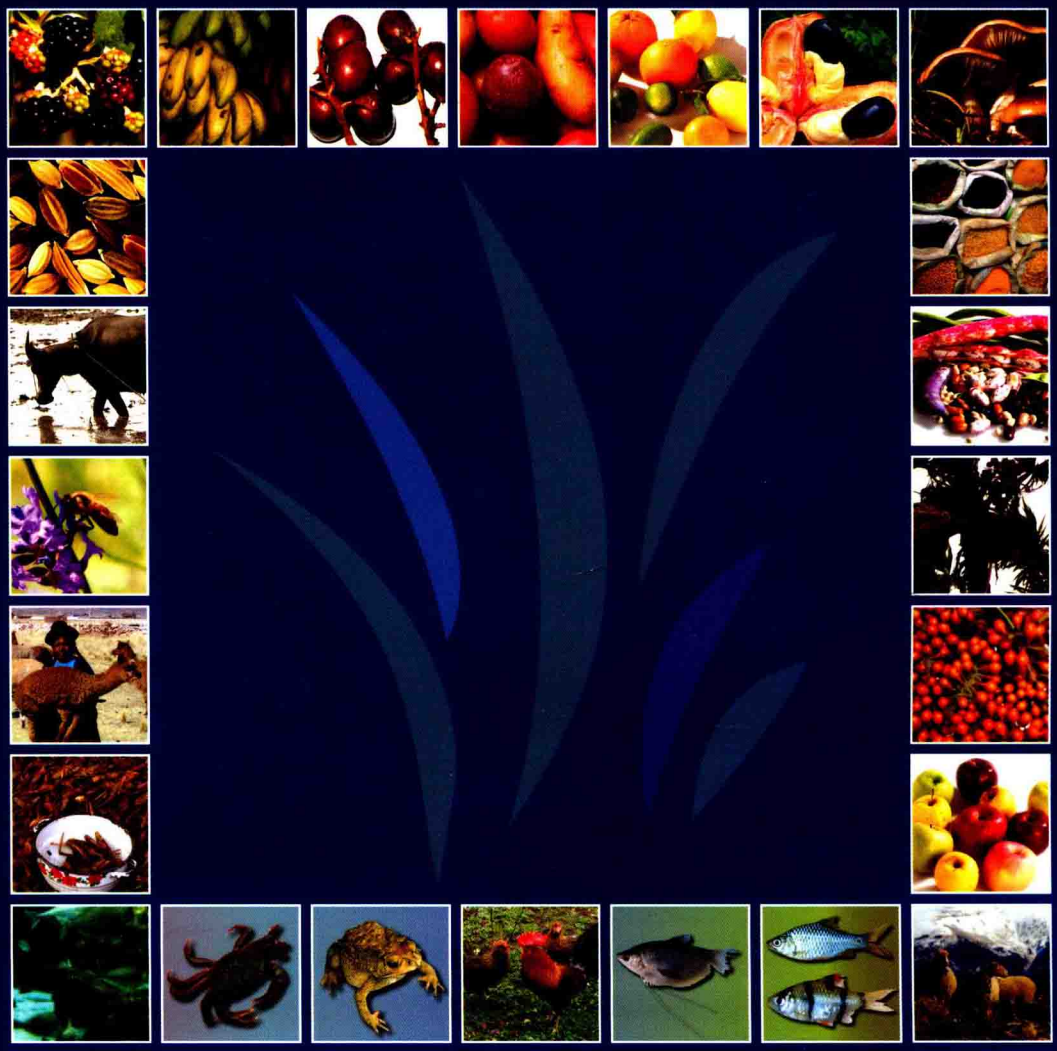
Expert Consultation on Nutrition Indicators for Biodiversity

2. Food consumption



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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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FOREWORD

Presenting nutrition and biodiversity as a single issue is one of the main rationales of the Cross-Cutting Initiative on Biodiversity for Food and Nutrition, which is led by Food and Agriculture Organization of the United Nations (FAO) in collaboration with Bioversity International. The overall aim of this initiative is to promote the sustainable use of biodiversity in programmes contributing to food security and human nutrition, and thereby raise awareness of the importance of this link for sustainable development.

The Convention on Biological Diversity (CBD) has proposed a suite of indicators to measure progress towards its 2010 biodiversity targets. Support to the delivery of the indicators is being provided by the 2010 Biodiversity Indicators Partnership (2010 BIP), a group of more than 40 international agencies coordinated by the United Nations Environment Programme – World Conservation Monitoring Centre (UNEP–WCMC). It was within this framework and through this support that FAO held an expert consultation for the development of the second nutrition indicator for biodiversity and food consumption. This second indicator is the complement to the first nutrition indicator on biodiversity and food composition. The development of indicators, tools and methodologies to measure and monitor biodiversity-related food composition and food consumption is critical in promoting sustainable diets.

Several new and ongoing projects in FAO, with the collaboration of the UNEP and Bioversity International, highlight the usefulness and importance of the two indicators. The projects aim at mainstreaming biodiversity into national and global agriculture, nutrition, and health policies and programmes. They will address the unique biological diversity that supports a large share of the world's food supply in a range of ecosystems that are global priorities for conservation.

Three fundamental components of the projects are: (i) expanding the knowledge base on the nutritional benefits derived from agricultural biodiversity; (ii) establishing regulatory frameworks and integrating multisectoral policies for mainstreaming biodiversity across environment, health, agriculture and development activities; and (iii) increasing awareness at all levels of the importance of food biodiversity for nutrition, food security, and environmental sustainability. The two nutrition indicators are crucial to understanding the role of biodiversity for food and nutrition, in pursuit of the ultimate goal of the conservation and sustainable use of biodiversity for food and nutrition.

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FAO is grateful for the very valuable contribution of the experts to the development of the Nutrition Indicator for Biodiversity related to food consumption, all of whom have collaborated in efforts toward the sustainable development and use of biodiversity for nutrition security. The full list of experts can be found in *Annex 1*.

Special appreciation is due to Suzanne Murphy, who served as Chairperson of the Expert Consultation, and to Lois Englberger and Keith Shawe, who served as rapporteurs.

The Consultation expresses its appreciation for the overall leadership, preparation and execution of the meeting to: Barbara Burlingame, Ute Ruth Charrondière, Marie Claude Dop and Béatrice Mouillé (FAO); Pablo Eyzaguirre (Bioversity International); Timothy Johns (McGill University); and the FAO Office in Washington, DC, especially A. Kaggwa Lubega, for their support in the administrative arrangements of the meeting. The Consultation is grateful to Giuseppina Di Felice for the layout of the report.

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ACRONYMS AND ABBREVIATIONS

BIP	Biodiversity Indicators Partnership
CBD	Convention on Biological Diversity
CBD–COP	Conference of the Parties to the Convention on Biological Diversity
CINE	Centre for Indigenous Peoples' Nutrition and Environment
cv.	Cultivar (from cultivated + variety)
EPIC	European Prospective Investigation into Cancer and Nutrition
FAO	Food and Agriculture Organization of the United Nations
FFQ	Food Frequency Questionnaire
GEF	Global Environment Facility
GFU	Global Facilitation Unit
INFOODS	International Network of Food Data Systems
ICNCP	International Code of Nomenclature for Cultivated Plants
ICZN	International Commission on Zoological Nomenclature
IUNS	International Union of Nutritional Sciences
ICDAM	International Conference on Diet and Activity Methods
LARReC	Living Aquatic Resources Research Center
MDG	Millennium Development Goal
NHANES	National Health and Nutrition Examination Survey
OAA	Other Aquatic Animal
UNEP–WCMC	United Nations Environment Programme – World Conservation Monitoring Centre
UPC	Universal Product Code
UPOV	International Union for the Protection of New Varieties of Plants
var.	Variety

SUMMARY

The development of nutrition indicators for biodiversity is a collaborative international process, led by FAO together with Bioversity International and other partners. The task is part of the Cross-Cutting Initiative on Biodiversity for Food and Nutrition.

The initiative was launched on the basis of a recognized link between biodiversity, food and nutrition and the need to enhance sustainable use of food biodiversity to combat hunger and malnutrition. The Cross-Cutting Initiative on Biodiversity for Food and Nutrition was formally established in 2006 by Decision VIII/23 A of the Conference of the Parties to the Convention on Biological Diversity (CBD–COP). The development of the food consumption indicator is supported by the 2010 Biodiversity Indicators Partnership (2010 BIP), coordinated by United Nations Environment Programme – World Conservation Monitoring Centre.

An Expert Consultation was held on 8 and 9 June 2009 in Washington, DC, the United States of America, to develop the food consumption Nutrition Indicator for Biodiversity. The 12 experts from nine countries agreed on an indicator for food consumption consisting of a count in different surveys of the number of foods reported with a sufficiently detailed description of genus, species, subspecies and variety/cultivar/breed. Reporting for this indicator will also include the number of dietary assessment surveys taking biodiversity into consideration in relation to the total number of surveys examined.

Monitoring the indicator will involve examining well-documented literature, including international, regional, national, sub-national survey reports and scientific literature. Reporting will be carried out by FAO every two years. It is hoped that the number of foods reported and the number of food consumption surveys taking account of biodiversity will show a positive trend, indicating the increasing recognition of the importance of biodiversity for food and nutrition.

It is expected that these indicators will become an advocacy tool to promote awareness of the importance of food biodiversity, including wild, indigenous and traditional foods, while contributing to nutrition security and the conservation and sustainable use of food biodiversity.

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1 OBJECTIVES

The overall objective of the nutrition indicators for biodiversity is to encourage the conservation and sustainable use of food biodiversity.

The specific objective of this Expert Consultation was to ***develop*** a Nutrition Indicator for Biodiversity related to food consumption; and by doing so to:

- ***identify*** existing data and data sources needed;
- ***develop*** a mechanism for reporting, which will allow FAO to monitor the indicator over time;
- ***identify*** agencies and institutes that will report to FAO on the indicator on a yearly basis;
- ***identify*** data gaps and research needs in order to improve the indicator;
- ***identify*** the dietary assessment instruments that are suitable for adaptation.

A secondary objective was to ***develop*** guidelines for adapting dietary assessment instruments to capture food biodiversity.

2 BACKGROUND

The development of nutrition indicators for biodiversity is an international collaborative process, led by the FAO together with Bioversity International and other partners. This initiative responds to an emerging global consensus that: (1) the simplification of diets, the growing incidence of chronic diseases and the raise in nutritionally-poor and energy-rich diets are linked to the neglect and decline in the use of locally-available nutritionally-rich foods (Popkin, 2006; Caballero, 2007; Damman, Eide & Kuhnlein, 2008), and that: (2) biodiversity is the source of many foods and dietary components that can reverse this unhealthy trend (Johns and Sthapit, 2004). Although considered essential for food and nutrition security through improved dietary choices and positive health impacts, it is seldom acknowledged in nutrition programmes or interventions. This is largely because of insufficient data on scientific food identification, composition, and methods for obtaining food consumption data for food biodiversity.

In 2004, the Conference of the Parties to the Convention on Biological Diversity (CBD–COP) recognized the linkages among biodiversity, food and nutrition and the need to enhance sustainable use of biodiversity to combat hunger and malnutrition, and thereby contribute to Goal 1 and 7 of the Millennium Development Goals (MDGs). The initiative on biodiversity for food and nutrition was formally established by decision VIII/23 A of the Conference of the Parties in March 2006. During this same period, the Commission on Genetic Resources for Food and Agriculture (10th session) requested the

Intergovernmental Technical Working Group on Plant Genetic Resources for Food and Agriculture to "provide guidance to FAO on how it could best support countries, on request, to ... indicate the relative priority of obtaining cultivar-specific dietary consumption data, in order to demonstrate the role of biodiversity in nutrition and food security."

The consumption of different varieties and breeds within a species may have a significant impact on nutritional adequacy, as considerable differences in nutrient composition have been found among varieties of the same crops (Burlingame, Charrondière & Mouillé, 2009). These studies showed a wide variability in nutrient levels among varieties and cultivars of the same species, demonstrating that the intake of one rather than another could represent the difference between nutrient deficiency and adequacy.

Biodiversity is reflected at three levels: the ecosystem or agro-ecological zone, the species contained in the ecosystem, and the genetic diversity within the species.

Many dietary assessment methods and instruments are capable of capturing food intakes at all these levels. However, few national or regional consumption surveys investigate or report food intakes at the cultivar/variety/breed level.

Food consumption data on wild, underutilized, indigenous and traditional plant and animal foods are limited and fragmented (Ogle, 2001; Krahn, 2005; Batawila *et al.*, 2007; Kuhnlein, Erasmus & Spigelski, 2009; Englberger *et al.*, 2009a; Roche *et al.*, 2007). Dietary surveys seldom attempt to collect intake information on these species or varieties, partly because: (i) dietary assessment instruments have been developed to capture the usual or habitual intakes of foods as reported by subjects rather than detailed information on specific varieties of the foods consumed; (ii) the corresponding compositional data are rarely available; and (iii) it is widely believed that survey participants are not able to recognize foods below species level. However, recent research suggests that this is not the case. A survey in Bangladesh has shown that more than 80 percent of households were able to identify rice by cultivar and 38 different cultivars were named (Kennedy *et al.*, 2005).

As the importance of food biodiversity becomes increasingly acknowledged, more research should be undertaken to study the consumption and composition of these foods. There are a limited number of studies linking biodiversity, nutrition and health. It is therefore necessary to develop research projects to analyse the composition of wild, underutilized, indigenous and traditional foods, to compile these data into accessible databases and to collect more consumption data on food biodiversity (FAO, 2005; Frison *et al.*, 2006).

Thus, in order to monitor biodiversity and nutrition, at least two indicators are needed: one on food composition and one on food consumption. In October 2007, FAO, together with Bioversity International, held an Expert Consultation and developed the Nutrition Indicator for Biodiversity on food composition. The food composition indicator was defined as a count of the number of foods with a sufficiently-detailed description to identify genus, species, subspecies and variety/cultivar/breed, and with at least one value for a nutrient or a bioactive component (FAO, 2008a). This indicator (Indicator 1) encourages the generation, compilation and dissemination of compositional data on food biodiversity, i.e., at variety/cultivar/breed level.

The present Expert Consultation developed the second Nutrition Indicator for Biodiversity on food consumption (in this and subsequent documents to be referred to as "Indicator 2"), which addresses nutrition and other fields such as agriculture, health and trade.

3 DECLARATION OF INTEREST

All experts submitted declarations of interest; none was considered to have a conflict.

4 THE INDICATOR

4.1 Definition of Indicator 2

Indicator 2 is a count of the number of foods reported in a survey and meeting the criteria described below.

A secondary survey indicator was also developed and is a count of the number of food consumption surveys and similar surveys (as listed in *Annex 3*) taking biodiversity into consideration in their design and/or reporting, with at least one reported food meeting the criteria for Indicator 2. It should be reported in relation to the total number of surveys examined.

4.2 Food Level

As defined for the Nutrition Indicator for Biodiversity on food composition, Indicator 2 also requires that foods are described at the genus, species and subspecies level and below. When different parts or stages of maturation of the same plant or animal are consumed, they should be counted separately; for example, the root and leaf, larva and adult animal, egg and bird, meat and

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milk, muscle meat and organ meat, ripe or unripe. No minimum amount or frequency of consumption is required.

Taxonomy is fluid and there is disagreement among taxonomic authorities at all levels of classification; non-taxonomists often use taxonomic terms inappropriately. Therefore, collaboration with botanists and zoologists will be needed for better food identification. In addition, genetic identification techniques or gene banks can be useful as they provide a more standardized identification. Hence, it is important to gather additional information on food identity, e.g., local names, specimens, photographs and accurate descriptions.

It was recognized that, in some cases, identification with scientific names at subspecies level and below and sometimes even at species level is difficult. For many wild or underutilized foods, taxonomic names do not yet exist and, in other cases, different taxonomic sources may provide different scientific names for the same food. Examples are certain fruits, vegetables, fish, snails and insects. It was therefore decided that wild or underutilized foods are exceptions to the general rule and may be included in Indicator 2 even if their taxonomic identification is only at species level and/or through a local name. If possible, the country/region/culture of origin should be provided, or a photograph or voucher sample.

Other exceptions are those foods which are varieties (taxonomic name always including 'var.') but which are considered as equivalent to food species. These foods need to be described with an additional cultivar name in order to be taken into consideration for Indicators 1 and 2 (e.g., *Brassica oleracea* var. *capitata* 'January King'). This additional criterion was necessary to avoid the reporting of commonly consumed foods and food consumption surveys without a specific biodiversity aspect for Indicator 2, and thus would artificially inflate the reporting on foods and surveys contributing to the indicators. Accordingly, the examples in **Table 1** demonstrate which of these 'variety' foods would contribute to Indicators 1 and 2.

As the reporting on Indicator 1 revealed many difficulties in deciding which foods should be included or excluded, detailed criteria were developed to guide users in reporting on Indicators 1 and 2. These general and specific criteria are listed in **Table 2**.

Table 1 Foods with cultivars contributing or not to Indicators 1 and 2

Food (species and varieties)	Cultivar	Contributing to Indicator 1 and 2 (yes or no)
Clementines (*Citrus reticulata* var. *clementine*)		No
Clementines (*Citrus reticulata* var. *clementine*)	'Oronules'	Yes
Nectarines (*Prunus persica* var. *nectarine*)		No
Nectarines (*Prunus persica* var. *nectarine*)	'Redgold'	Yes
Mange-tout peas or snowpeas (*Pisum sativum* var. *macrocarpum*)		No
Mange-tout peas or snowpeas (*Pisum sativum* var. *macrocarpum*)	'Oregon Sugar Pod'	Yes
Asparagus (*Asparagus officinalis* var. *altilis*)		No
Asparagus (*Asparagus officinalis* var. *altilis*)	'Del Monte 361'	Yes
Peppers, capsicum, chilli, green (*Capsicum annuum* var. *grossum*)		No
Peppers, capsicum, chilli, green (*Capsicum annuum* var. *grossum*)	'Kung Poa'	Yes
Peppers, capsicum, green/red (*Capsicum annuum* var. *grossum*)		No
Peppers, capsicum, green/red (*Capsicum annuum* var. *grossum*)	'King Arthur'	Yes
Broccoli (*Brassica oleracea* var. *botrytis*)		No
Broccoli (*Brassica oleracea* var. *botrytis*)	'Green Magic'	Yes
Cauliflower (*Brassica oleracea* var. *botrytis*)		No
Cauliflower (*Brassica oleracea* var. *botrytis*)	'Ravella'	Yes
Brussels sprouts (*Brassica oleracea* var. *gemmifera*)		No
Cabbage (*Brassica oleracea* var. *capitata*)		No
Cabbage (*Brassica oleracea* var. *capitata*)	'January King'	Yes
Curly kale (*Brassica oleracea* var. *acephala*)		No
Curly kale (*Brassica oleracea* var. *acephala*)	'Winterbor F1'	Yes
Spring greens (*Brassica oleracea* var. *acephala*)		No
Swede (*Brassica napus* var. *napobrassica*)		No
Swede (*Brassica napus* var. *napobrassica*)	'Wilhemsburger'	Yes
Turnip (*Brassica rapa* var. *rapifera*)		No
Turnip (*Brassica rapa* var. *rapifera*)	'Bavarian Turnip'	Yes

Table 2 Criteria for the inclusion or exclusion of foods for Indicator 1 and 2

Foods included	Foods not included
• Foods at cultivar/variety/breed level for common and imported foods (e.g., rice, banana, potato), preferably with scientific name. • For those foods contributing to the indicators: – different parts of plants (e.g., leaf, root, flower, stem, fruit) and animal (e.g., all muscle cuts contribute only once but all organs count separately); – different stages (e.g., egg, larva and young/adult animal); – only raw foods; except if just the cooked form of this food is available; – Colour and/or shape describing the variety, cultivar or breed (e.g., pear, brown-skinned (*Pyrus* sp.) or snake gourd (*Trichosanthes cucumerina*). • Foods with the number of cultivars/varieties/breeds per species even if not described by taxonomic or local name (e.g. *Musa* spp. – 4 varieties). • Common foods which are taxonomically speaking varieties <u>with</u> additional cultivar name. Examples are found in **table 1** (e.g., *Brassica oleracea* var. *capitata* 'January King'). • Ingredients of recipes, processed foods or botanical supplements/extracts (including beverages), if they meet criteria. • Genetically-modified foods	• Common or imported foods (e.g., rice, banana, potato) described only at species level, even if other specifications are given such as: – region; – country; – season; – colour as part of the food name (e.g., green beans) or as indication of processing (e.g., white or brown rice); – shape (e.g., medium-size carrot); – species name is followed by author (e.g., L. or Linn. [for Linnaeus], Mill.), which should not be confused with the cultivar/variety/breed name. • Foods with unspecific name, e.g., "wild green leaves", "reef fish", "bush meat". • Common foods which are taxonomically speaking varieties when described <u>without</u> an additional cultivar name. Examples are found in **table 1** (e.g., *Brassica oleracea* var. *capitata*). • Processed foods or recipes • Supplements, and plant or animal extracts (as powders, capsules, etc.) if not meeting the criteria • Fortified foods

Table 2 (cont.)

Foods included	Foods not included
• Wild and/or underutilized foods only described at genus/species level and/or with local name (e.g., "grasshopper"). The underutilized foods must be recorded on the 'list of underutilized species contributing to the nutritional indicators for biodiversity'[1]. • A local name in addition to an English/Spanish/French or taxonomic name if it is indicative for a variety/cultivar/breed (e.g., in brackets after the English/Spanish/French name).	• Common or imported foods described only with local name, or in addition to English, Spanish, or French name seeming to be the translation of the food (i.e., not indicative of variety/cultivar/breed.

[1] The reference list for underutilized food for biodiversity can be found on the INFOODS website http://www.fao.org/infoods/biodiversity/index_en.stm .

4.3 Surveys and Survey Instruments

Food consumption data from all surveys will be included, as long as they provide data on food consumption contributing to Indicator 2. These surveys will be mainly food consumption surveys but also could include market surveys, ethno-biological investigations and inventory studies. No minimum criteria are required concerning data quality, geographic area, time or population groups, and all surveys will count equally. The baseline count would not go back further than 1990 (date of the survey).

As of today, few national or regional food consumption surveys report foods at the cultivar/variety/breed level. In order to increase the reporting on food biodiversity, these surveys would need to be adapted to capture the additional dimension of food biodiversity. The review of existing surveys capturing food biodiversity was used to investigate the potential of dietary assessment instruments to obtain data on the consumption of foods contributing to Indicator 2. It was concluded that many dietary assessment instruments can be adapted to identify and/or report food biodiversity as varieties/cultivars/breeds or by local names (see *Annex 3*). It seems that people are most likely to identify by local name those foods at cultivar/variety/breed level that they frequently consume, grow or rear, or which are important in their local food system or are marketed by their variety name (e.g., Granny Smith apple).

It is recognized that investigators need to know how to adapt existing instruments to capture the consumption of foods contributing to Indicator 2. Therefore, FAO in collaboration with biodiversity experts in food consumption will develop guidelines on adapting existing food consumption instruments to capture food biodiversity.

To evaluate how well surveys take biodiversity into consideration in their design and/or reporting, a **secondary survey indicator** was developed to count the number of food consumption and similar surveys with at least one food reported for Indicator 2 and thus taking biodiversity into consideration in relation to the total number of surveys examined. The same survey, even if reported in different publications, should be counted only once.

4.4 Publication Level

All published and unpublished surveys can be used to search for food consumption data which report on food biodiversity. This includes peer-reviewed articles, published data in international/regional/national/sub-national survey reports, other published data (e.g., non-peer-reviewed journals), unpublished data, conference presentations (including posters), abstracts published from meetings and theses.

4.5 Reporting

The reporting on Indicator 2 and the secondary survey indicator will be carried out using a template (see *Annex 4*) that can be used at different levels: ecosystem, sub-national, national, regional or international.

The list of foods contributing to Indicator 2 should be included in each report, either in the template (if there are only few foods), an annex, or through a link to a website. Foods reported in different surveys for the same geographical area in the same year, will be counted only once. However, the different surveys would all contribute to the secondary survey indicator.

In some survey reports, not all cultivars/varieties/breeds consumed might be named but only a number per food listed (e.g., potato, four varieties). It is recommended that, in future, these cultivars/varieties/breeds names should also be listed and that the guidelines encourage this list to be presented in future reports.

As no national registry of food consumption surveys exists, information will have to be actively collected by FAO through literature searches and by contacting different organizations, e.g., national nutrition institutes, International Network of Food Data Systems (INFOODS) Regional Data Centre Coordinators, European networks (e.g., European Food Consumption Validation), Ministries of Agriculture and/or Health, principal investigators for large-scale ongoing surveys such as European Prospective Investigation into Cancer and Nutrition (EPIC) or the National Health and Nutrition Examination Survey (NHANES). FAO will collect this information and report on Indicator 2 every second year to the Global Environment Facility (GEF), CBD and UNEP and in international fora.

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