Importance of Sequence Sharing
Case study – Food Safety
The burden of foodborne diseases is substantial

Every year foodborne diseases cause:

- almost in 10 people to fall ill
- 33 million healthy life years lost

Foodborne diseases can be deadly, especially in children <5

- 420,000 deaths
- Children account for 1/3 of deaths from foodborne diseases

FOODBORNE DISEASES ARE PREVENTABLE. EVERYONE HAS A ROLE TO PLAY.
International Food Safety Authorities Network

- Voluntary network of national food safety authorities (600+ members from 188 Member States) managed jointly by WHO/FAO

- Used for information sharing and response to food safety emergencies to reduce PH and trade impact
Example

- **Outbreak of Listeriosis in South Africa** linked to internationally distributed ready-to-eat meat, 2017/2018

- **Listeriosis is a serious disease** (~30% of cases die) caused by consumption of contaminated ready to eat foods

- **Invasive listeriosis:** Due to the **long incubation period** (1-8 weeks), it is challenging to identify the particular food which was the cause of the infection
Outbreak of Listeriosis in South Africa (SA)
Whole Genome Sequencing (WGS) enabled identifying the outbreak and the implicated food.

2017-2018, 1060 cases, 216 deaths

- Outbreak declared 05/12/2017
- First alert 18/7/2017
- WHO GOARN/INFOSAN mission & factory sampling
- RECALL
- WHO missions to support systems strengthening

- WGS: enabled focus on outbreak cases
- One case in Namibia: Sharing of strain/sequencing in SA → not part of the outbreak
- SA shared sequences → cases worldwide with history of SA travel could be discarded

http://www.nicd.ac.za
Use of WGS and sequence sharing worldwide

- 3 open databases exist already, mirroring each other (NCBI/EMBL-EBI/DDBJ)
- Example of open, near real-time sharing: GenomeTrakr; Labs in the US and several other countries
- Contains 280,000 sequences
- >300 new sequences per day
- In Europe: 29/30 countries using WGS
- Use in Americas, Africa and Asia
WGS and open sharing: Timely sharing of foodborne disease pathogen sequences helps rapid outbreak investigation and surveillance

- **Sharing of sequences:**
  WGS can provide strong pieces of evidence, linking contaminated food to human cases and detecting outbreaks much earlier and faster.

- **Timely sequencing & global cooperation:**
  During a food safety emergency involving WHO/INFOSAN, the Secretariat can facilitate the sequencing of samples upon request to potentially link cases to an ongoing outbreak.

- **Rapid access to globally shared WGS information** helps to manage increasingly complex international food safety events and link outbreaks and cases over time and geographic areas.

  Ex1) Salmonellosis in France (contaminated infant formula), 2005-2018 ← outbreaks linked to same factory
  Ex2) Salmonellosis in Europe (contaminated infant formula), 2010-2019 ← outbreaks linked to same factory

Both events affected approx. 100 countries worldwide.

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