

1.

**OCCURRENCE, VIRULENCE AND PATHOGENICITY OF
ESCHERICHIA AND *SALMONELLA* FROM KALES IN NAIROBI
AND ITS ENVIRONS**

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2.

INTRODUCTION AND LITERATURE REVIEW

- Vegetables play a role in nutrition as healthy diets and contribute to the economy of many countries.
- Consumers are encouraged to eat more of these products.
- In Kenya vegetables are consumed regularly by nearly every household in rural and urban areas.
- In Nairobi the vegetable sector has developed within the city and surrounding areas with kale (*sukuma wiki*) being the most grown vegetable.
- Kale are contaminated by microbial flora along food chain (farm to the table)

3.

Sources of contamination

•Pre-harvest contamination sources:

- Feces
- irrigation water
- inadequately composted manure
- wild and domestic animals
- human handling

4.

Sources of contamination (cont.)

•Post harvest contamination sources:

- Feces
- human handling/cross-contamination
- harvesting equipments
- wash and rinse water
- transport vehicles and containers
- improper packaging
- wild and domestic animals
- Vermin and insects

5.

Sources of contamination (cont.)

•Post harvest contamination sources:

- Feces
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- Vermin and insects

6.

Urban agriculture in Nairobi

- Use of waste water and ‘night soil’ in peri-urban agriculture in Nairobi is extensive and unregulated (Kang’ethe *et al.*, 2007)
- 36% of the farmers in the city use sewage and waste water for irrigation subjecting the vegetables to contamination by human pathogens (Njenga *et al.*, 2007)
- Farmers use untreated waste water to grow vegetables and have been reported to block the sewers to get the water
- Water samples from Nairobi rivers show fecal coliforms exceeds 1000FC/100ml recommended levels by WHO for unrestricted irrigation
- Potential health threats posed by use of polluted water has been raised but there is scanty information on specific pathogens (Hide, 2001)

7.

Possible vegetable contaminants

- Traditionally vegetables are considered low risk foods due to their low pH and natural barriers to pathogens.
- Currently increased disease outbreaks occur due to evolution of more pathogenic forms of bacteria that can now survive such conditions
- The pathogenic bacteria of major concern are: *Salmonella*, *Shigella*, *Escherichia* and *Klebsiella*. In other countries, *Salmonella* and *Escherichia* (serotype O157:H7) are commonly isolated.

8.

E.Coli and Salmonella

- Coliforms are a good indicator of fecal contamination and poor hygiene.
- *Escherichia coli* has been used as a non-pathogenic indicator of enteric pathogens, such as *Salmonella*.
- Some strains of *E.coli* are virulent:
 - 1) Enterohemorrhagic (EHEC)
 - 2) Enteroinvasive (EIEC)
 - 3) Enteroaggregative (EaggEC),
 - 4) Enteropathogenic (EPEC), and
 - 5) Diffusely adherent (DAEC):

9.

E.Coli and *Salmonella* (cont).

- The worst of these is EHEC, O157:H7

Salmonella

- There are more than 2400 known serotypes, grouped in the two species *bongori* and *enterica*
- Have been associated with animal products but has been isolated from many types of vegetables grown in contaminated sites
- Recently *Salmonella* and *E. coli* O157:H7 have been isolated with higher frequency from fresh farm produce
- There is limited data available on level of vegetable contamination by these pathogens in Kenya.

10.

***Salmonella* and *Escherichia* in non-host environment**

- Both *Salmonella* and *Escherichia* can survive well in the animal host.
- Outside the animal host they face limited nutrients, osmotic stress, large variation in temperature and pH
- Non-host environment has been shown to lower pathogenicity of these microorganisms
- However there is little documentation on this.
- There is, therefore, need to compare organisms isolated from kales and those from human origin with respect to their pathogenicity and hematological changes