Changes in the nutrient content of meat in an obesity context

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The obesity epidemic

Being either overweight or obese is becoming the norm in both developed and developing countries
- Globally 1.1 billion adults are overweight or obese
- ±26% of the world's population

However, obesity is not a new phenomenon.
The fat lady of Malta

The earliest work, in the 3 millennium BC, represents a goddess honored by the island's farmers
Ancient Egyptian Hieroglyphs

- In the temple of Hatshepsut at Deir el-Bahari, Egypt
- The Puntite chief and his rather obese wife bring gifts to the leader of the Egyptian expedition
Venus of Willendorf

- Venus of Willendorf created 24,000 – 22,000 B.C.
- Ancient Austrian ultimate of female beauty and fertility
Dolly Dimpels, 1927

- 4 foot 11 inches, she weighted in at 555 pounds
- Suffered a heart attack at age of 23
- In 14 months she lost 443 pounds
- Guinness World Book of records: *The greatest weight loss in the shortest period of time*
Art Museums & nobility

- In previous times, only the rich could afford to eat enough to become obese
- Ample paintings in art museums
- Most of these people were kings, queens, or otherwise affiliated with nobility
OBESITY – A status symbol

THEN
"The Tuscan General" Alessandro del Borro, 1645

TODAY
26% of the world

Reserved for the rich

Affecting EVERY household
Disease
- Communicable
- Non-communicable

Double burdens

Malnutrition
- Undernutrition
- Overnutrition
Double burden of disease - imbalances

- **Overnutrition: obesity**
  - Long-term energy imbalance
  - Physiological effects: risk for chronic diseases
  - Failing health that results from dietary practices that do not coincide with nutritional needs
  - Often characterized by overnutrition of macronutrients and micronutrient undernutrition

- **Undernutrition**
  - Stunting and waisting

*Today a combination of undernutrition and overnutrition in the same communities, in single households and even in the same individual (obese mother with micronutrient deficiencies)*
1. Double burden: Pattern of disease

- **Communicable diseases (CD)**
  Infectious diseases such as measles and malaria

- **Chronic non communicable diseases (NCD)**
  Include premature heart disease, stroke, diabetes, and cancers

**Overweight and Obesity are serious underlying problems that increase risk of NCDs**
Deaths by regions, 2000

Global burden of disease in developing countries

1990
- Infectious diseases: 49%
- Non Communicable Diseases: 27%
- Injuries: 15%
- Mental Illness: 9%

2020
- Infectious diseases: 22%
- Non Communicable Diseases: 43%
- Injuries: 21%
- Mental Illness: 14%

679,900 deaths/year
- 65% communicable
- 28% non-communicable
- 7% injuries
### Major risk factors in South Africa

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>% of all deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 HIV/AIDS</td>
<td>26.3</td>
</tr>
<tr>
<td>2 High blood pressure</td>
<td>9.0</td>
</tr>
<tr>
<td>3 Tobacco smoking</td>
<td>8.5</td>
</tr>
<tr>
<td>4 Alcohol harm</td>
<td>7.1</td>
</tr>
<tr>
<td>5 High BMI (Excess weight)</td>
<td>7.0</td>
</tr>
<tr>
<td>6 Interpersonal violence</td>
<td>6.7</td>
</tr>
<tr>
<td>7 High cholesterol</td>
<td>4.6</td>
</tr>
<tr>
<td>8 Diabetes</td>
<td>4.3</td>
</tr>
<tr>
<td>9 Physical inactivity</td>
<td>3.3</td>
</tr>
<tr>
<td>10 Low fruit and veggie intake</td>
<td>3.2</td>
</tr>
</tbody>
</table>

- 8 risk factors are diet related
- 6 risk factors have direct relation to obesity

Many people suffer from the consequences of inappropriate diets

*Norman et al.*, 2007 SAMJ 97:7
Burden of disease attribute to excess body weight in adults > 30 yrs (South Africa)

Joubert et al., 2007 SAMJ 97:8
2. Double burden: Malnutrition

The global obesity pandemic

Adult obesity has doubled between 1980 and 2004

- In 2006 87.4% of the adult USA population were reported as overweight, with more than ⅓ of them being obese (CDC, 2006)
- In 2003 56.2% of SA adult population was recorded overweight or obese (DHS, 2003)

Childhood obesity rates have increased 3 – 4 x over the past 25 years in the UK

- WHO reported more than 20 mil overweight children under 5yrs in 2005 (Musgrave, 2007)
- In SA 9.3% of children <5 yrs were recorded as overweight in 1999 (NFCS, 1999)
Burden of disease

- In contrast to the increase in obesity, developing countries, **nutritional deficiency diseases** continue to exist, especially in rural communities.
- South African Children
  - Stunted for age = 30.9%
  - Underweight for age = 9.6%
  - Overweight for age = 9.3%  (NFCS, 1999)

RESULT

Double burden of persisting undernutrition in the midst of the growing epidemic of obesity and non communicable diseases (NCD)
Nutrition education: COMBATING THE EPIDEMIC

- A wide multi-sectoral approach is required
- Nutritional information:
  - current
  - correct
  - scientifically based
  - available
  - consumer must be able to relate to it
- Promoting healthy lifestyles
- Result required is lifestyle changes in behaviour such as:
  - controlled dietary intake
  - increased physical activity
COMBATING THE EPIDEMIC
The Way Forward

1. Changing the diet and lifestyle of individuals

2. Changing the composition of foods consumed

3. Utilizing the power of consumer education

Healthier food choices and eating habits
1. Changing the diet and lifestyle of individuals

- **Dietary patterns and lifestyle habits** influence an individual’s weight.

- **To decrease obesity rates**: Significant changes are needed, to the **individuals choices** they make as well as the **nutrient content of the food** consumed.

- **Barriers include**
  - Lack of understanding of basic nutrition information such as basic kJ content of products and the amounts they should consume daily.
  - Many are unaware of their weight status and the impact thereof on their general health.
  - There is also a general perception that nutrition information is inconsistent and has thus resulted in a lack of trust in the nutrition industry.
Consumer drive towards improved health

- Individuals base their **food choices and other decisions regarding nutrition** on the knowledge they have gained throughout their life.

- Science is in its nature innovative.

- Information is updated with time.

However, most individuals continue to base their decisions on information they have learned in the past.
Consumer drive towards improved health

- Consumers are becoming more aware of nutrition and the impact on their health
- As the incidence of chronic diseases continues to increase, consumer interest in the positive role food can play in controlling these afflictions, are growing
- Individuals are increasingly becoming more aware of:
  - eating a healthy nutrient dense, energy controlled diet
  - partaking in more physical activity to increase energy expenditure
  will decrease the chance of becoming overweight
1. Dietary Energy Supply (DES) 1993-95 Kcal/caput/day 2390

Percentage of DES by major food groups

- Cereals (ex. beer)
- Starch roots
- Sweeteners
- Pulses, nuts, oilcrops
- Fruits & Vegetables
- Vegetable oils
- Animal Fats
- Meat & offals
- Fish & seafood
- Milk & Eggs
- Other

Note: Value not indicated if below 1%

2. Proteins
   - % from:
   - Vegetable products 1993-95 % of total proteins 84.2
   - Animal products 1993-95 % of total proteins 15.8

   % Energy from:
   - Protein 1993-95 % of total energy 10.0
   - Fat 1993-95 % of total energy 15.2
General trend in South Africa decrease in animal fat consumption
Consumer drive towards improved health

- Various dietary guidelines recommend red meat as a primary dietary component that forms an important part of a balanced and varied diet
- Ample research that provides evidence that red meat can be consumed daily
- However, based on epidemiological studies, obesity and high saturated fat intake from animal products has a positive association
  - This evidence has led to a concern that total fat intake should be restricted by consuming smaller portions less frequently
Meat consumption patterns

● Meat is a favourite and popular food in the diet
● However, the popularity of red meat is globally declining in favour of white meat and other non-meat proteins
● SA Consumption (per capita)
  Red meat decreased and white meat increased

(Abstract of Agricultural Statistics, 2008)
Meat consumption patterns

- **Price difference** contributes to this phenomenon
- **Perceived health risk** associated with the consumption of products considered to be **high in total and saturated fat**
- **Detrimental effects** on health such as increasing cholesterol levels and increasing health risk
- Concern about the link between **high saturated animal fat intake** and **CVD** as well as **certain types of cancers**
2. Changing the composition of foods consumed

Changing the nutrient content of meat, by reducing the fat content and/or fatty acid ratio these possible detrimental effects that meat can be altered to minimize/eliminate risk

Include:

● modulating the diet of the monogastric animal and/or ruminant

● post slaughtering activities such as the trimming of visible fat both in store and at home

● applying specific cooking methods
Response to consumer demand

● The nutritional attributes of meat are greatly researched worldwide

● Many studies reflecting the substantial changes over time in the composition of carcass meat

● Especially reduction in the amount of fat
  ▪ on the carcass itself, through breeding programmes and modification of animal feeds
  ▪ after trimming in the shop e.g. seam butchery technique or at home
  ▪ changes in cooking methods such as limiting addition of fat during cooking
Changes in fat composition

- New Zealand Beef (15 years)
  23.3 % in 1981 decreased to 7.1% in 1997

- United Kingdom (20 years)
  Pork decreased by 30 %, beef by 15 % and lamb by 10 % from 1978 to 1995

- South African target grade beef (60 years)
  32% in 1949 decreased to 18% in 1981 to 13% in 1991 to 12.5% in 2008
Global decreases in fat content of meats observed over time
Need for country specific composition data

- According to the Medical Research Council Table: Composition of South African lamb contains on average 21.6% fat – highest % fat of any other meat and therefore perceived as very unhealthy

- However, these values were not South African but derived from the USDA Food Composition Database

- Study done in 2007 on A age, fat code 2, South African lamb:
  On average only 9.01% fat
The Heart Foundation and Cancer Foundation states that the fat content of food products consumed should be less than 10%

The implication:
Many meats, according to recent composition data, in fact lies within the recommended fat percentage range.
Other health implications

- Fat % in food products are not just associated with **weight gain**, but also with **elevated blood cholesterol levels**
  - Another of the major risk factors for NCD
  - Ranked 7th risk factor for death in SA, causing 4.6% of all deaths per year

- Not all fatty acids are equal or responsible for elevated cholesterol level

- Animal fat contain **Essential Fatty Acids (EFA)**
  - Essential for normal growth and development
<table>
<thead>
<tr>
<th>Fatty Acids (FA)</th>
<th>Mutton</th>
<th>Lamb</th>
<th>Beef</th>
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</thead>
<tbody>
<tr>
<td><strong>Cholesterol-raising FA</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C14:0 Myristic acid</td>
<td>0.22</td>
<td>0.46</td>
<td>0.37</td>
</tr>
<tr>
<td>C16:0 Palmitic acid</td>
<td>2.15</td>
<td>1.96</td>
<td>3.27</td>
</tr>
<tr>
<td><strong>Cholesterol-neutral FA</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C18:0 Stearic acid</td>
<td><strong>1.91</strong></td>
<td>1.16</td>
<td><strong>2.99</strong></td>
</tr>
<tr>
<td><strong>Cholesterol-lowering FA</strong></td>
<td><strong>3.63</strong></td>
<td><strong>3.22</strong></td>
<td><strong>5.40</strong></td>
</tr>
<tr>
<td>C18:1 Oleic acid</td>
<td>3.40</td>
<td>2.97</td>
<td>5.12</td>
</tr>
<tr>
<td>C18:2 Linoleic acid</td>
<td>0.22</td>
<td>0.25</td>
<td>0.24</td>
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<tr>
<td>C20:4 Arachidonic acid</td>
<td>0.01</td>
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<td>0.04</td>
</tr>
<tr>
<td><strong>Effect unknown</strong></td>
<td></td>
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<td></td>
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<td>C16:1 Palmitoleic acid</td>
<td>0.13</td>
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Selecting lean beef cuts in a carcass

- Fillet: 6 % fat
- Thin flank: 33 % fat
- Chuck: 16 % fat
- Prime rib: 22 % fat
Selecting lean lamb cuts in a carcass

- Loin: 11% fat
- Leg: 6% fat
- Shoulder: 9% fat
3. Consumer education

- Meat is an excellent source of protein containing all the essential amino acids
- Good source of many vitamins & minerals
  e.g. iron, zinc and the B-vitamins
- In leaner meat the nutrient content is higher, as fat dilutes the nutrients in the protein matrix
  Accurate up-to-date composition values are important, as a change in one nutrient can have an impact on the values of other nutrients
- With the high prevalence of nutritional deficiencies, the higher percentage of nutrients in lean red meat, increases the positive health image due to consumption
Conclusion

COMBATING THE EPIDEMIC

- Changing the diet and lifestyle of individuals
- Changing the composition of foods consumed
- Utilizing the power of consumer education

Healthier food choices and eating habits
Conclusion

COMBATING THE EPIDEMIC

Changing the diet and lifestyle of individuals

Consumers are becoming more aware of what they eat, and of the consequences of their dietary habits on their overall health and wellbeing.

This has resulted in a “global hunger” for healthier food options.
Conclusion

COMBATING THE EPIDEMIC

Changing the diet and lifestyle of individuals

Changing the composition of foods consumed

It becomes evident that in context of obesity it is possible for the consumer to gain optimal nutritional benefits and abstain from excessive kJ and saturated fat intake when consuming red meat on a regular basis.

This can be done by considering: age of the animal, the fat class, specific carcass cut, as well as low fat cooking and preparation methods.
Conclusion

COMBATING THE EPIDEMIC

- Changing the diet and lifestyle of individuals
- Changing the composition of foods consumed
- Utilizing the power of consumer education

With the current progression in nutrition research showing new nutritional data and composition values, education becomes the essential means to inform the consumer of these changes to enable educated food choices.

Only then will any strategy be effective in combatting the global epidemic of obesity.
Fat evolution
Thank you for your attention

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