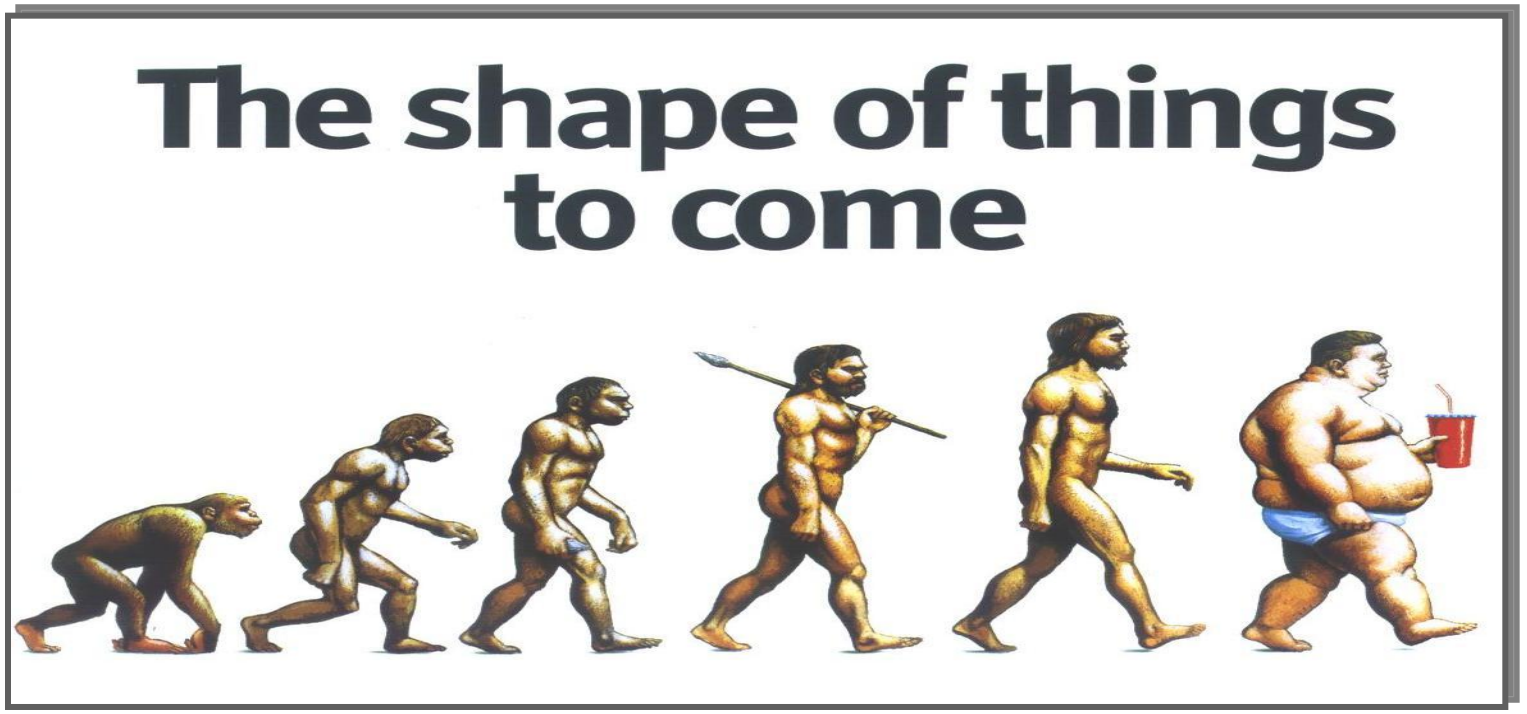


OBESITY- I

Dr. Bhavna Puwar
Assistant Professor
Community Medicine

Definition

- An abnormal growth of adipose tissue due to enlargement of fat cell size (hypertrophic) or increase in fat cell numbers (hyper plastic) or combination of both

WHO 894 Obesity Report

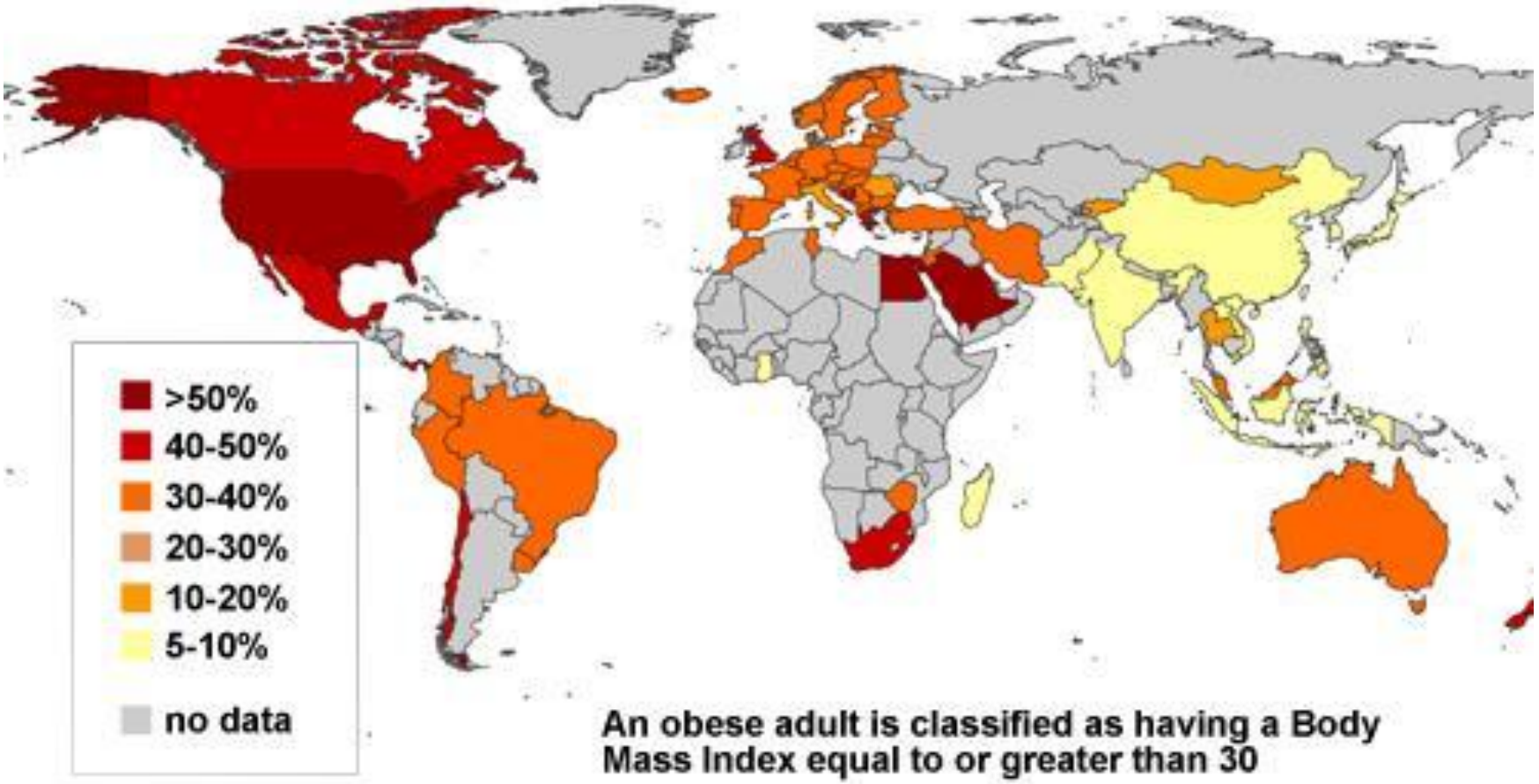
Overweight

Weight in excess of average for a given sex, height, and age usually due to obesity but may be due to abnormal muscle development or fluid retention


Prevalence

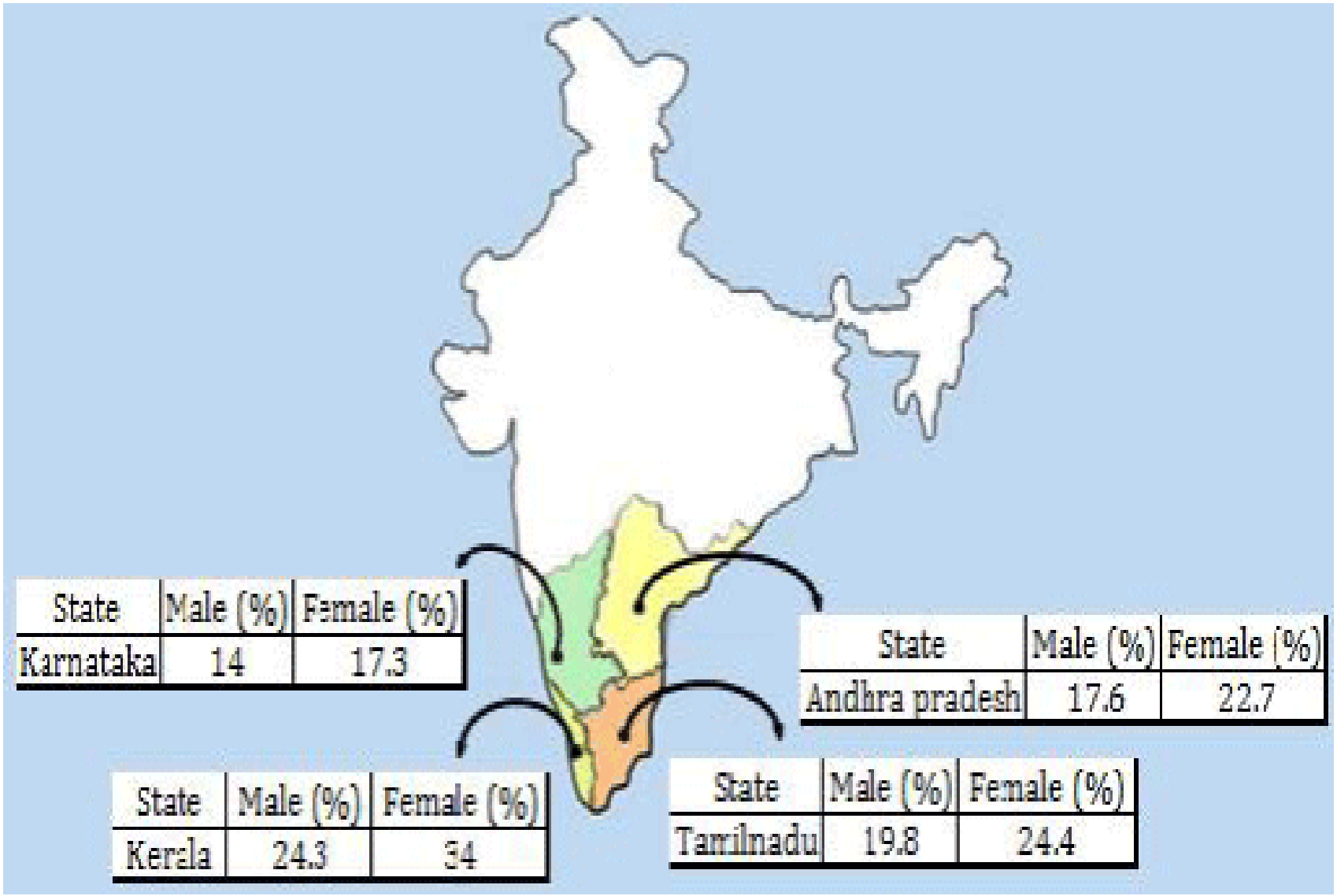
Obesity Worldwide

Percentage (%) of obese adults worldwide



An obese adult is classified as having a Body Mass Index equal to or greater than 30

Source: World Health Organization



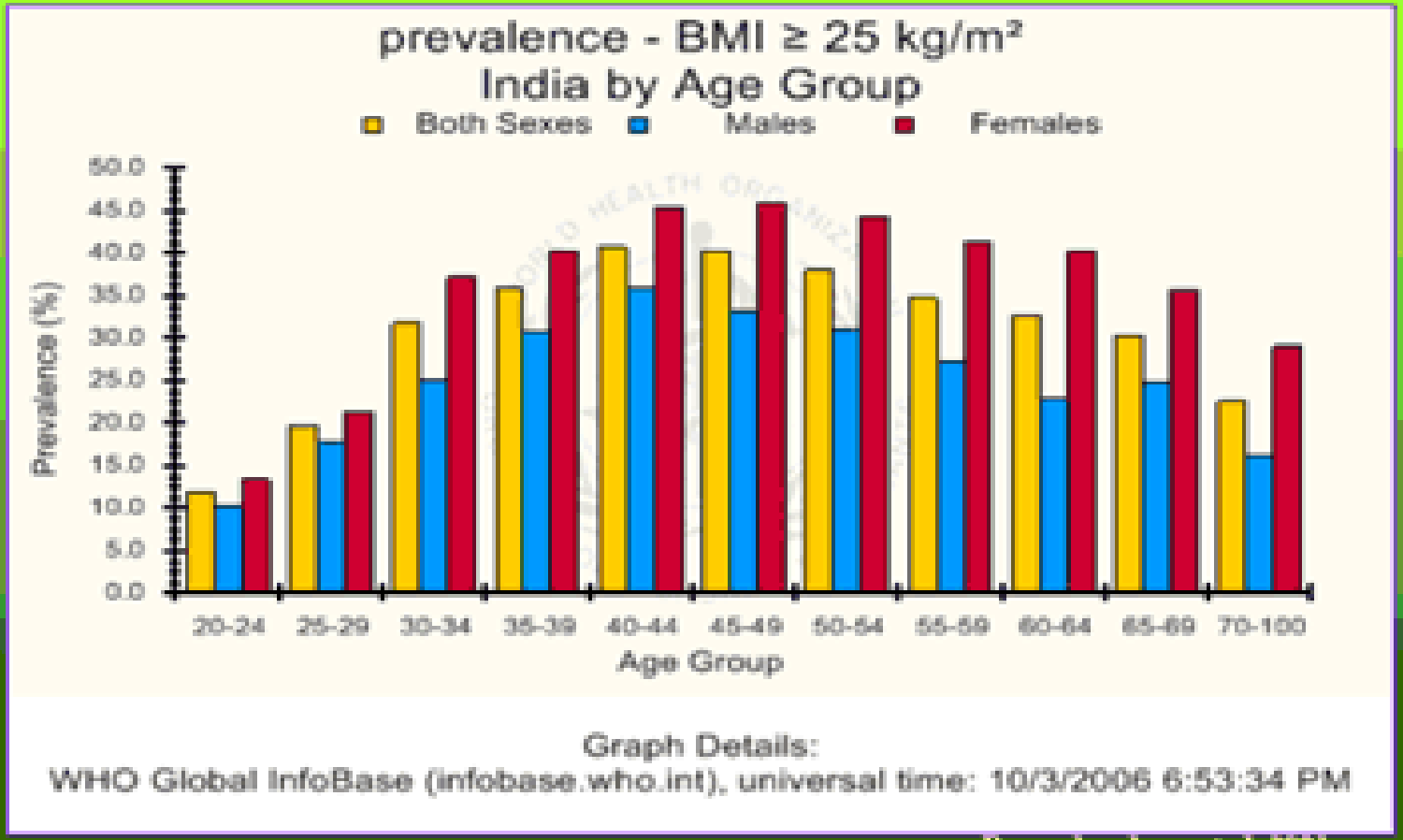
State	Male (%)	Female (%)
Karnataka	14	17.3

State	Male (%)	Female (%)
Andhra pradesh	17.6	22.7

State	Male (%)	Female (%)
Kerala	24.3	34

State	Male (%)	Female (%)
Tamilnadu	19.8	24.4

INDIA: PREVALENCE OF BMI>25



Ramachandran et al, 2001

Worldwide :Reports indicate that in 2005, at least 400 million people were obese.

This will continue to increase, and in 2015,2.3 billion adults will be overweight, and more than 700 million will be obese.

Though data indicates that obesity rates among Americans have peaked.

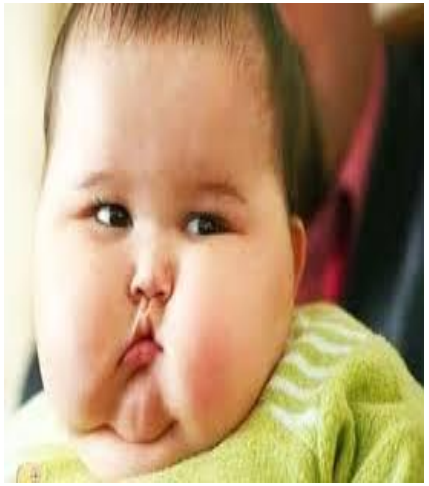
- Statistics point to increasing obesity rates in both the developed and developing world in adults as well as children.
- Urban more than rural
- Women more then men (obesity) although men have higher overweight then women
- It has been estimated to affect 20 to 40 % of adult and 10 to 20 % of children and adolescent in developed countries

India

- Exact prevalence not known but approx. 8% of population is estimated to have BMI > 25.
- India is undergoing nutrition transition

Epidemiological determinants

- 1. Age:
- Intrauterine nutrition directly contributes to size , shape and composition of the body
- Infant with excessive weight gain have an increased incidence of obesity in later life (hyperplastic obesity).
- Difficult to treat with conventional
- methods.
- Affect at all age, Increase with age
- -**Preschool and adolescent**,Early thirties in men



2.Sex

- Physiologically female store more fat.
- Rise occurs much earlier and to a greater extent in females.
- Female have tendency to channel extra energy into fat while male use it for protein synthesis.
- Menopausal women tend to gain weight rapidly.
  - Men gain weight between- 29 – 35
  - Women gain weight between- 45 – 49

3.Genetics

30-40% of the variability in weight between individuals is accounted for by heredity:

- Metabolic rate
- Appetite and satiety
- Thermic response to food
- Body fat distribution
- Predisposition to be active or inactive
- Obesity tends to run in families

Thrifty genotype hypothesis

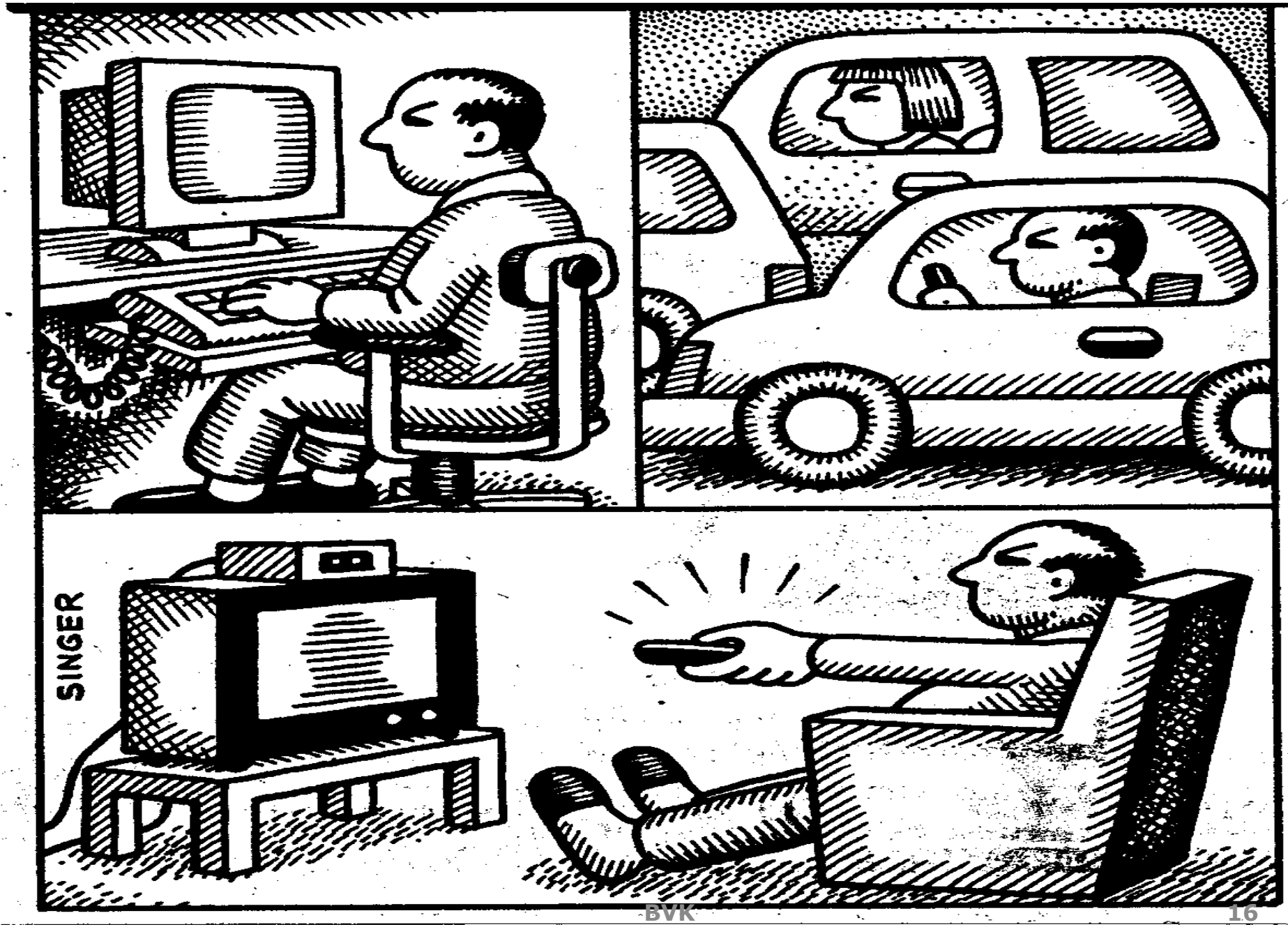
- Population exposed to inadequate or fluctuation of food are genetically selected for high level of efficiency in calorie utilization or fat storage
- When more food become available this efficiency may lead to increase of prevalence of obesity and NIDDM

4.Physical Activity Patterns

- **Regular physical activity is protective against weight gain**
- Increase prevalence of obesity can be attributed to rise in sedentary life style.

Main components of Physical exercise

- 1.Occupational work
- 2.Household and out of occupation jobs
- 3. Leisure time physical activity including sports and exercise


SINGER

5. Socio-economical Class

- Higher the class – increase the prevalence of obesity

6. Eating Habit :

- Eating in between meals, preference to sweets, refined foods and fats. Night-eating, Binge-eating.
- Composition of diet, frequency of eating and amount of energy derived from it.
- More energy leads to post prandial hyperlipidemia and deposition of TG

7. Psychosocial factors

- Depression, anxiety, frustration, loneliness in childhood
- Secret eater

8. Family tendency

- Obese parents → obese children

9. Endocrine factors

- Cushing' syndrome, hypothyroidism, GH deficiency.

10. Alcohol

- 7 kcal/g of energy
- Associated with increase in abdominal fat deposition.

11. Education

- In developed nation it is seen associated with poor education level but in developing nations no data available

12. Smoking

- Smoking induce acute rise in BMR and tend to reduce food intake relative to non smoker.
- Thus smoker frequently gain weight after giving up the habit

13. Drugs

- Cortico-steroids, contraceptive, insulin, β adrenergic blockers can promote weight gain.

- **Ethnicity**:
- Pima Indians of Arizona and Austrailian aboriginals tend to have high prevalence of obesity.
- Indians living overseas also tend to gain intra abdominal fat
- **Diseases**:
- Hypothyroidism, Cushing's disease and hypothalamic tumors are rare causes of weight gain
- Contraception:
- Loss of ovarian function

- Body image:
- Increased weight seen as a sign of health and prosperity

Modernization

- Improvement in standard of living and available services
- Transport
- Home
- Workplace
- Public places
- Sedentary pursuits

- Urbanization: Diet, physical activity, transport, food availability, other facilities. Moving / Walking out
- Playing on local streets
- Changing Occupations: Working Women, role of machines.
- Globalization of world markets: Food has reached largely from local level to global level.

Change in social circumstances

- Marriage
- Childbirth
- New job
- Climate change
- Food intake, selection, preparation modifiable by cultural factors

DAILY EXPR

THE BEST AND MOST UP TO DATE COVERAGE

The World's Greatest Newspaper

How to get rich....FAST

SEE PAGE 52

FREE INSIDE: YOUR ESSENTIAL EIGHT-PAGE JOB

TIMEBOMB OF ILLNESS IN OUR CHILDREN

Exclusive: Couch potato generation face

Daily Mail

THURSDAY, FEBRUARY 21, 2002

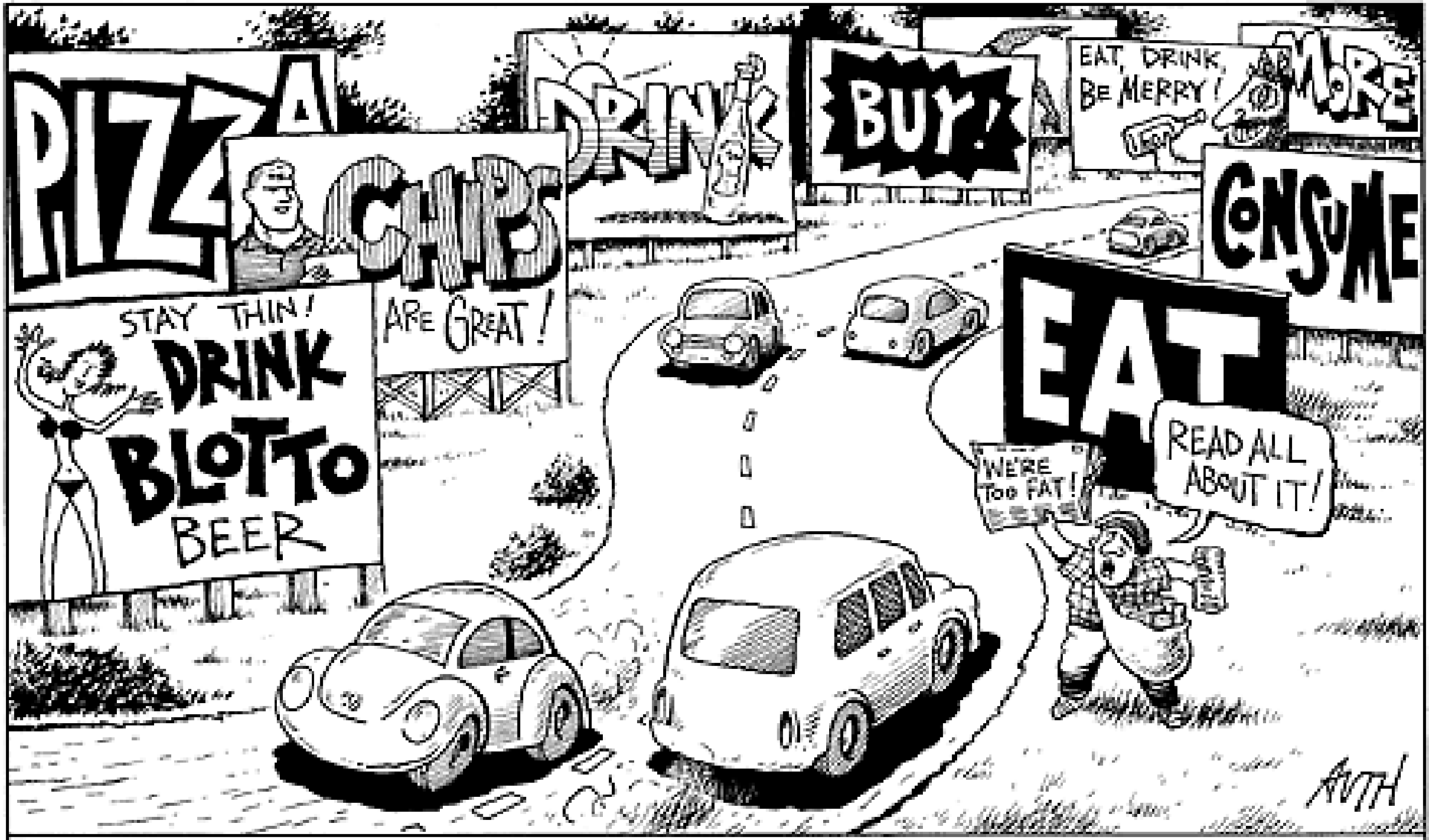
Newspaper of the Year 40p

QUEENS OF THE

Kylie and Dido beat the boys to snatch pop's top awards

SEE PAGES 8-9 and 24-25

DIABETES THREAT TO COUCH POTATO CHILDREN



$11 BILLION IS SPENT YEARLY ADVERTISING CONVENIENCE FOODS, SNACKS AND ALCOHOLIC BEVERAGES.

FRENCH FRIES

20 Years Ago

210 Calories
2.4 ounces

Today

610 Calories
6.9 ounces

Calorie Difference:
400 Calories=Walk
2hrs and 40 min

Marketing to Children

Broadcasting bad health

Why food marketing to children needs to be controlled

A report by the
International Association of Consumer Food Organizations
for the World Health Organization consultation
on a global strategy for diet and health

Text by K Dalmeny, E Hanna, T Lobstein

The International Association of Consumer Food Organizations (IACFO)

The Food Commission
94 White Lion Street
London N1 9PF
UK
Tel: +44 (0) 20 7837 2250
Fax: +44 (0) 20 7837 1141
Email: iacfo@foodcomm.org.uk
Web: www.foodcomm.org.uk;
www.parentsjury.org.uk

Center for Science in the Public Interest (US)
1875 Connecticut Ave. N.W.
Suite 300
Washington, DC 20009
USA
Tel: 001 (202) 332-9110
Fax: 001 (202) 265-4954
Email address: cspi@cspinet.org
www.cspinet.org

Centre for Science in the Public Interest (Canada)
Suite 4550, CTTC Building
1125 Colonel By Drive
Ottawa, Ontario K1S 5R1
Canada
Tel: 001 (613) 244-7337
Fax: 001 (613) 244-1559
Email: jefferyb@istar.ca
Web: www.cspinet.org/canada

Japan Offspring Fund
2F 2-5-2, Koji-machi
Chiyoda
Tokyo 102-0083
Japan
Tel: 0081 3 52760 256
Fax: 0081 3 5276 0259
Email: jof@nifty.ne.jp
Web: www.nmjp.or.jp/JOF/

Manipulating children's behaviour

- Confuse nutritional knowledge, e.g.

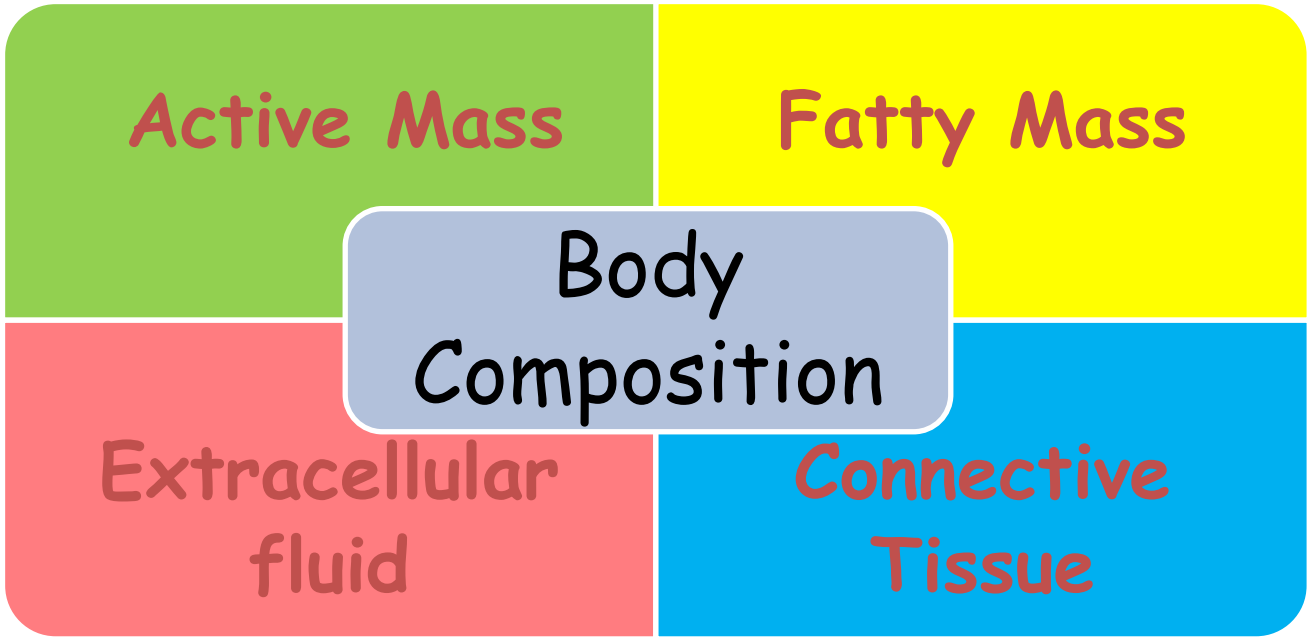
  fruit is present in the product like slice/ frooti.

- Changes food preferences.
- Changes purchasing behaviour
- Influences choice and consumption by Brand
- Alters balance of categories of food eaten.

UK Food Standards Agency, 25th September, 2003.

THE TRUTH ABOUT OBESITY

The search for **genetic factors** involved in obesity should not obscure the truth that the **environmental** factors probably are more important.



Obesity→ Increase in fatty mass at the expense of other parts of body

1.BMI (Quetelet's index):

$$\frac{\text{Weight(kg)}}{\text{Height}^2\ \text{(m)}}$$

2.Ponderal Index:

$$\frac{\text{Height (cm)}}{\text{Cube root of wt (kg)}}$$

3.Broca's Index: Height(cm)-100

4.Lorentz's formula:

$$\text{Ht-100-} \quad \frac{\text{Ht(cm)-150}}{\text{2(W)/4(M)}}$$

5.Corpulence Index: $\frac{\text{Actual weight}}{\text{Desirable weight}}$

Should not exceed 1.2

Body Mass Index (BMI)

- BMI is a simple index of **weight for height**
- Commonly used to classify overweight and obesity in adults.
- Correlates more closely with **body fat content** than other anthropometric measurements.

BMI Calculation

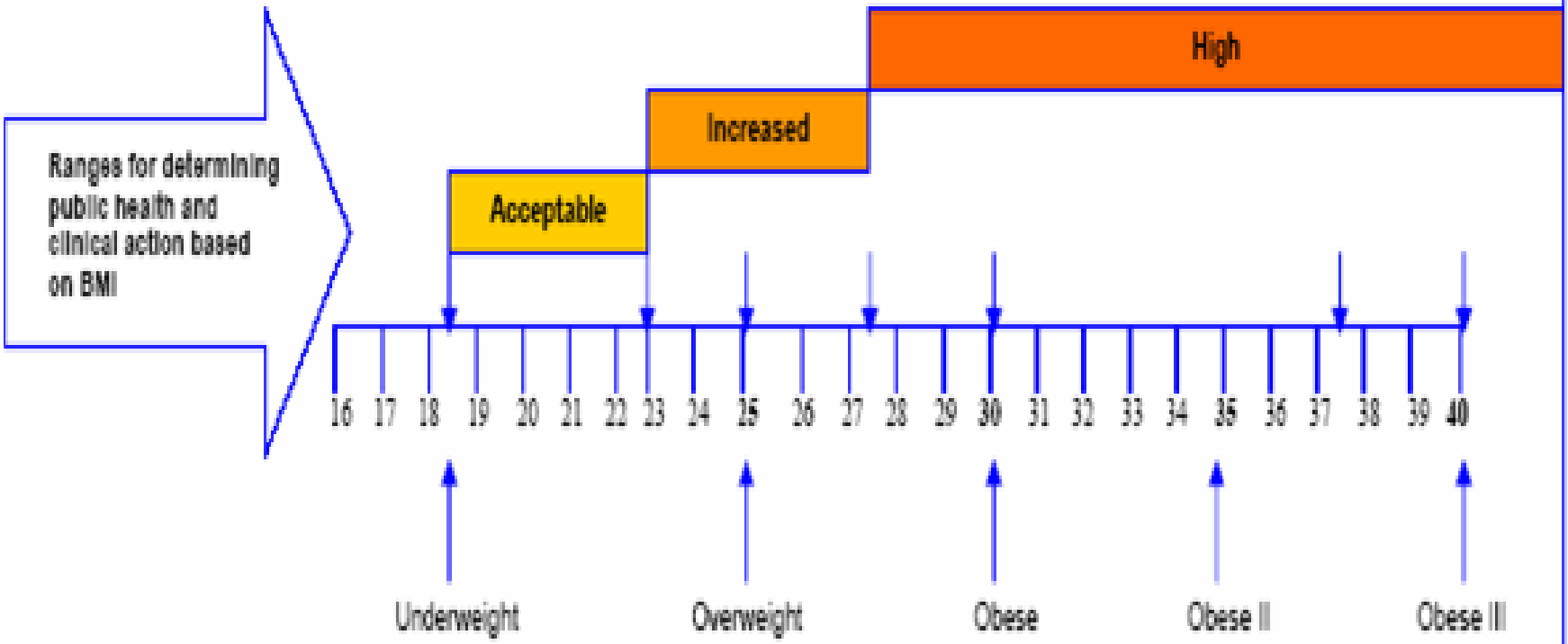
- Your weight in kilograms divided by the square of your height in meters -Kg/ m^2

- **BMI: $\frac{\text{Weight (kg)}}{\text{Height (m2)}}$**

Classification using Body Mass Index

	WHO guidelines	Proposed Asia Pacific guidelines
Underweight	< 18.5	< 18.5
Normal	18.5-24.9	18.5-22.9
Overweight	25.0-29.9	≥ 23
At risk	----	23-24.9
Obesity	30-34.9 (Class I) 35-39.9 (Class II)	25-29.9 (Class I) ≥ 30 (Class II)
Extremely	≥ 40 (Class III)	

- Given BMI may not correspond to the same degree of fatness across population.
- Also % of body fat increases with age upto 60-65 years.
- Amount of Fat is higher in women than men with equivalent BMI


Ranges for determining public health and clinical action based on BMI
High
Increased
Acceptable
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
Underweight
Overweight
Obese
Obese II
Obese III

HEIGHT (in ft)	HEIGHT (in mts)	IBW (Min) (BMI 18.5 min)	OPTIMUM RANGE (BMI 20 to 21.5)	IBW (max) (in kgs) (BMI 23 - max)
4' 9"	1.45	39	42 - 45	48
4' 10"	1.47	41	44 - 47	51
4' 11"	1.5	42	45 - 48	52
5'	1.52	43	46 - 49	53
5' 1"	1.55	44	48 - 52	55
5' 2"	1.58	46	50 - 54	57
5' 3"	1.6	47	51 - 55	59
5' 4"	1.63	49	53 - 57	61
5' 5"	1.65	50	54 - 58	62
5' 6"	1.68	52	56 - 61	65
5' 7"	1.7	54	58 - 62	67
5' 8"	1.73	56	60 - 65	69
5' 9"	1.75	57	61 - 66	70
5' 10"	1.78	58	63 - 68	73
5' 11"	1.8	59	64 - 69	74
6'	1.83	62	67 - 72	77
6' 1"	1.85	63	68 - 73	78
6' 2"	1.88	65	70 - 75	81
6' 3"	1.91	67	72 - 77	83
6' 4"	1.93	68	74 - 80	85

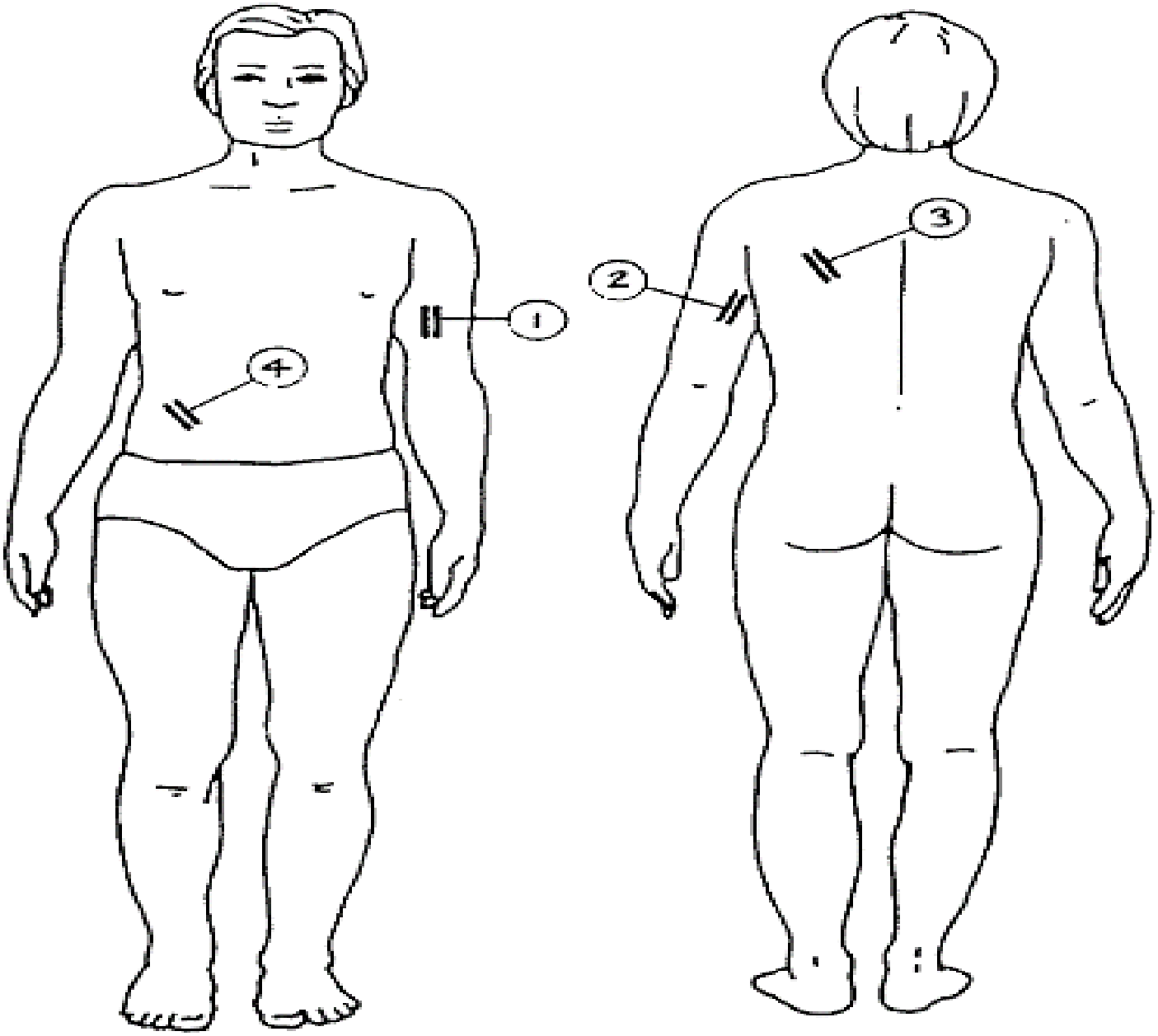
Skinfold thickness:

- Rapid and noninvasive method
- Herpeden's skin calipers

- **Sites**: Mid triceps, biceps, sub scapular and supra illiac
- Sum of all should be ,<**40mm** for boys and, <**50 mm** for girls

- Unfortunately no standard exist and in extreme obesity measurement may be impossible

Skinfold thickness:


1
2
3
4

3.Waist circumference

- Convenient and simple measurement.
- Unrelated to height
- Co- relates closely with BMI and WHR
- Approximate index of intra- abdominal fat mass and total body fat.
- Change in WC reflect changes in risk factor for CVS disease and other chronic disease.

Measuring Waist circumference

At a level midway between the lower rib margin and iliac crest with the tape all around the body in horizontal position. Risk increases if waist circumference is **>102 cm** in men and **>88 cm** in women

Waist-to-hip ratio

Desired Ratio

Women: ≤ 0.8

Men : ≤ 1.0

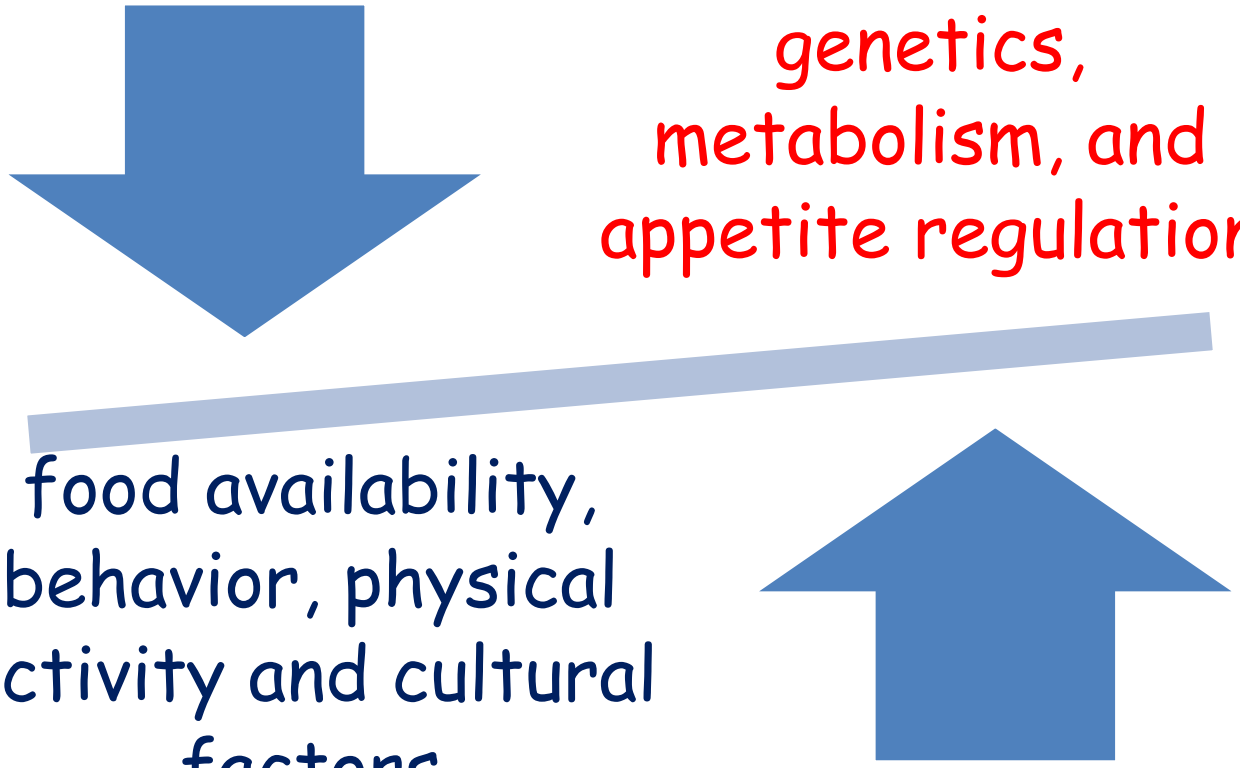
Ratio = WAIST / HIPS

TO FIND RATIO
Waist: Measure at narrowest point with stomach relaxed

Hips: Measure at fullest point

Natural History

- Pre obese static
- Dynamic phase
- Obese static



- **Environmental factors may exacerbate prevalent genetic tendencies to gain weight.**

- Obese individuals differ not only according to the degree of excess fat which they store but also in the regional distribution of that fat within the body.

- **Excess abdominal fat** is a great a risk factor for disease as is excess body fat per se.

Classification as per fat distribution

- **Android(Abdominal /central, male)**

Collection of fat mostly in the abdomen (above the waist)

- Apple-shaped
- Associated with insulin

resistance and heart disease

Gynoid (below the waist, females)

- Collection of fat on hips and buttocks

- pear-shaped

- **Longer the waist line -Shorter the life line**

- **Environmental Factors/Influences**:
- Modernization
- Increasing urbanization
- Changing Occupation
- Globalization of world markets
- Change in social circumstances
- Others: Socio Economic Status, Education, Body image

- **Facts:** Carbohydrate and protein balance regulated well
- Fat: Capacity to store fat in human is unlimited and highly efficient. Fat is palatable and pleasurable. It induces satiety ,but is ill sustained , leading to rebound

  increase.
- Consumption of sugar –

  excess energy balance

THANK YOU