



# **Global Overview of the Double Burden of Nutrition**

## ***Why this Conference Matters Now?***

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# THANK YOU!!

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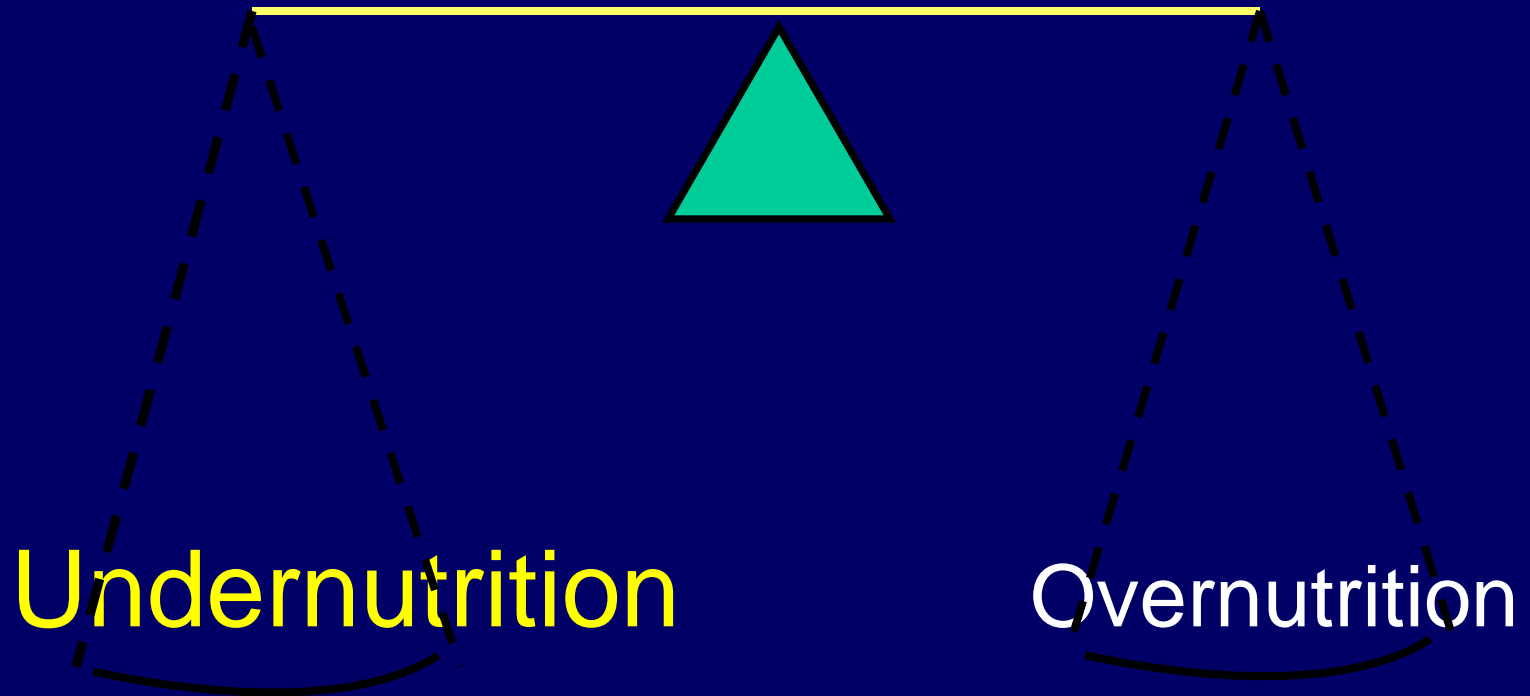
# The “Double Burden”



**ONE GLOBAL ISSUE!**

# NUTRITION

*“The Double Burden”*



How much does undernutrition  
cost?



- Mortality statistics do not capture long term effects on human capital

# Undernutrition

↑ BMI by 10% in Ethiopia



↑ Work output 23%

↑ Wages 27%

**A 1% loss in adult height as a result of childhood stunting is associated with a 1.4% loss in productivity**

(JM Hunt, 2005)

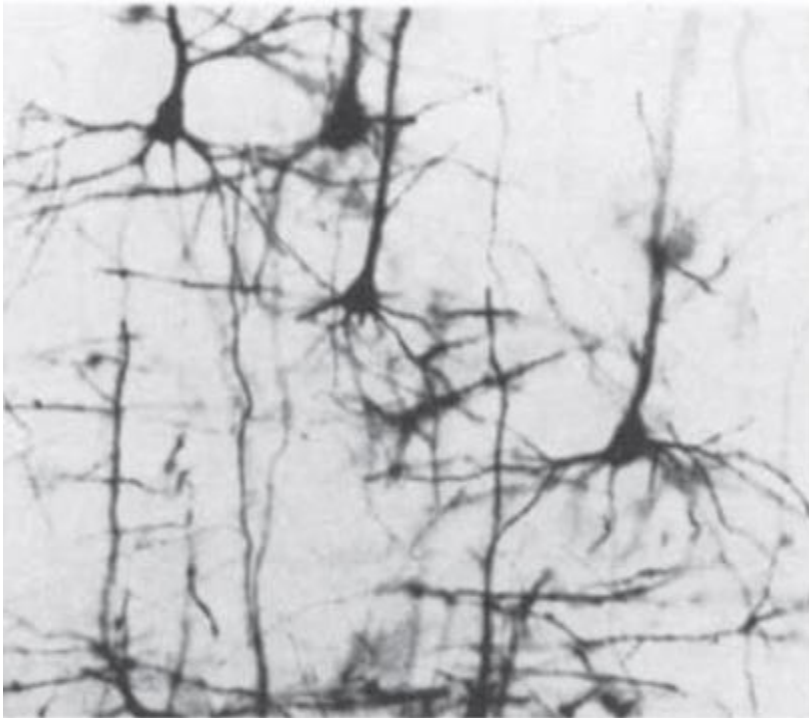
<u>Percentile</u>	<u>Male</u>	<u>Female</u>	<u>Δ</u>
50th	177 cm	164 cm	8%
3rd	163 cm	151 cm	8%

**8% ↓height = ↓11.2% productivity!!**



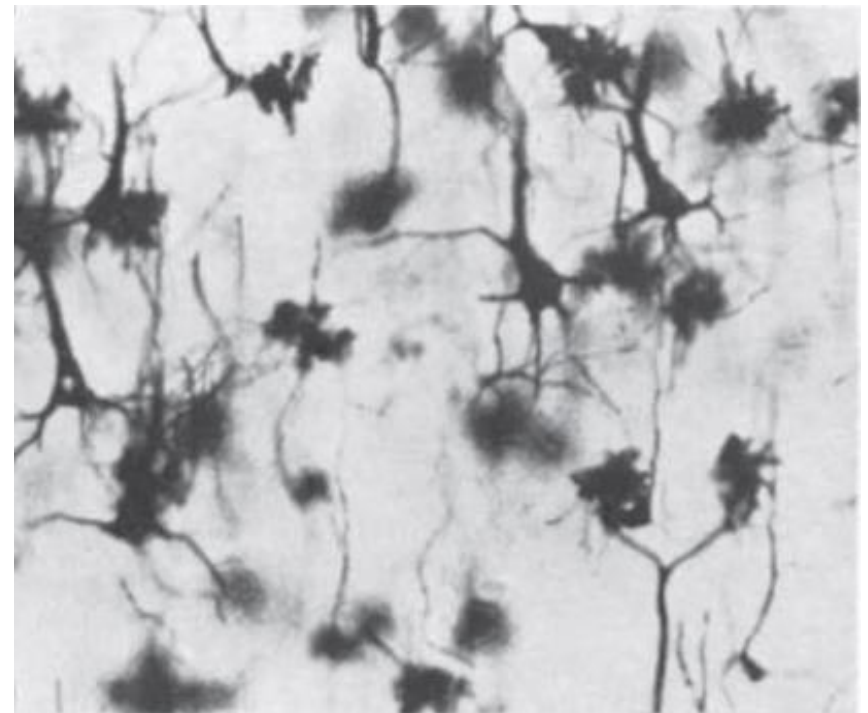
# Stunting and brain development

**Normal**



**Typical brain cells**  
Extensive branching

**Stunted**



**Impaired brain cells**  
Limited branching  
Abnormal, shorter branches

# Soldiers – US, North Korea, South Korea



# Stunting in Armenia

*(Increasing over 10yrs: now 18-36%)*

- ↑ risk of LBW offspring
- ↑ neonatal/infant mortality
- ↓ mental/behavioral performance
- ↑ risk of “adult chronic diseases”

*Low birth weight = 6-7%. Therefore, stunting occurs post delivery!*



*“Hidden” Malnutrition*  
Micronutrient Deficiencies

**Focus on 7 sentinel nutrients:**

**Iron**

**Iodine**

**Vitamin A**

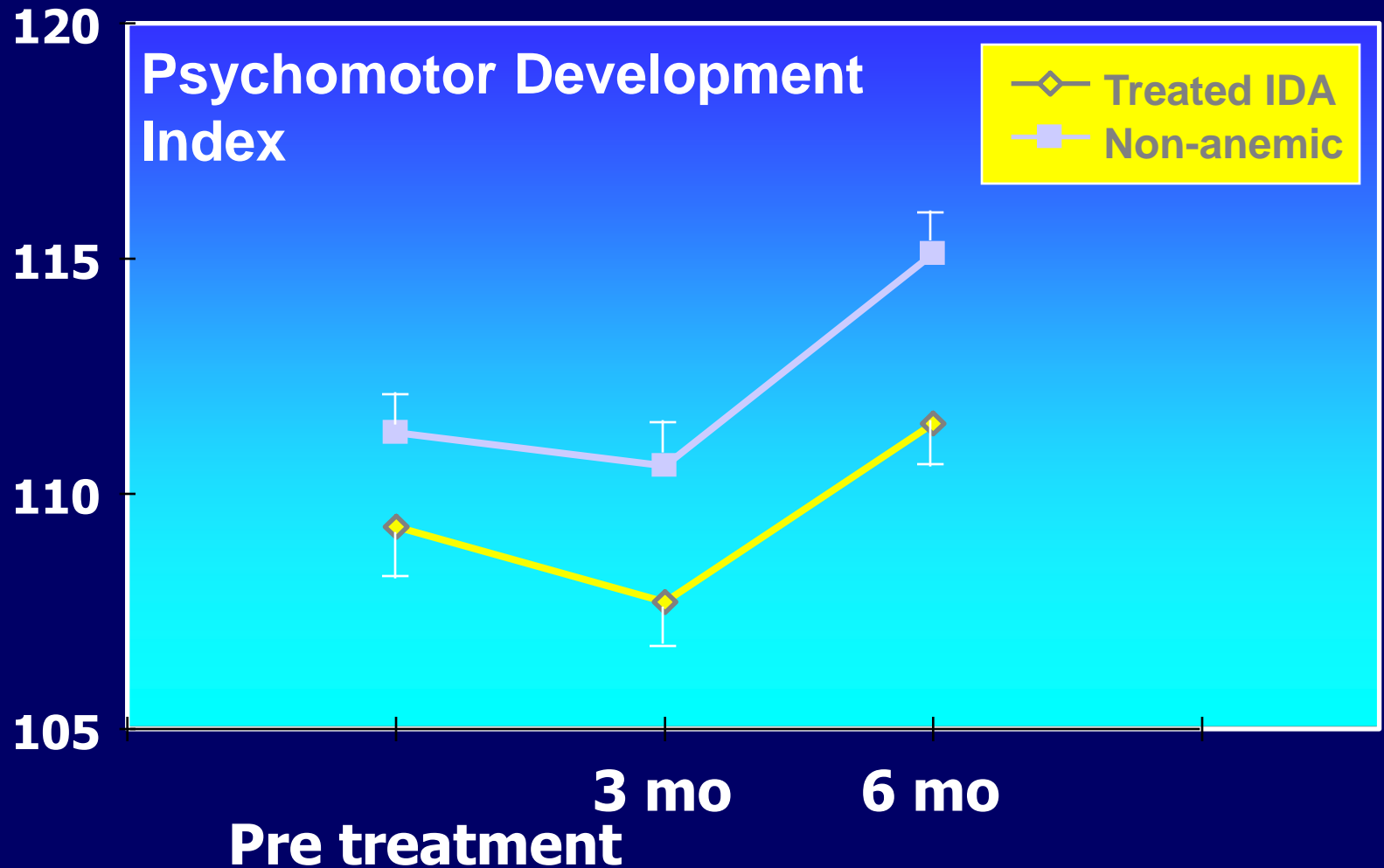
**Zinc**

**Folate**

**Vitamin D**

**Calcium**

# *PDI of Bayley Scales in IDA and Non-Anemic Groups During Treatment*



# Nutritional Indicators in Armenia

- “Low birth weight” ~7%
- Stunting ~ 19%
- Anemia in children 30-60%
- Anemia in women ~12-25%

FAO Armenia Report, 2005, Informal information from Nov.1<sup>st</sup>,2011 visit to Ichevan

# Probable “Treatable” Major Nutritional Deficiencies in Armenia

- *Vitamin D*
- *Calcium*
- *Folic acid*
- *Iron*
- *Iodine?*

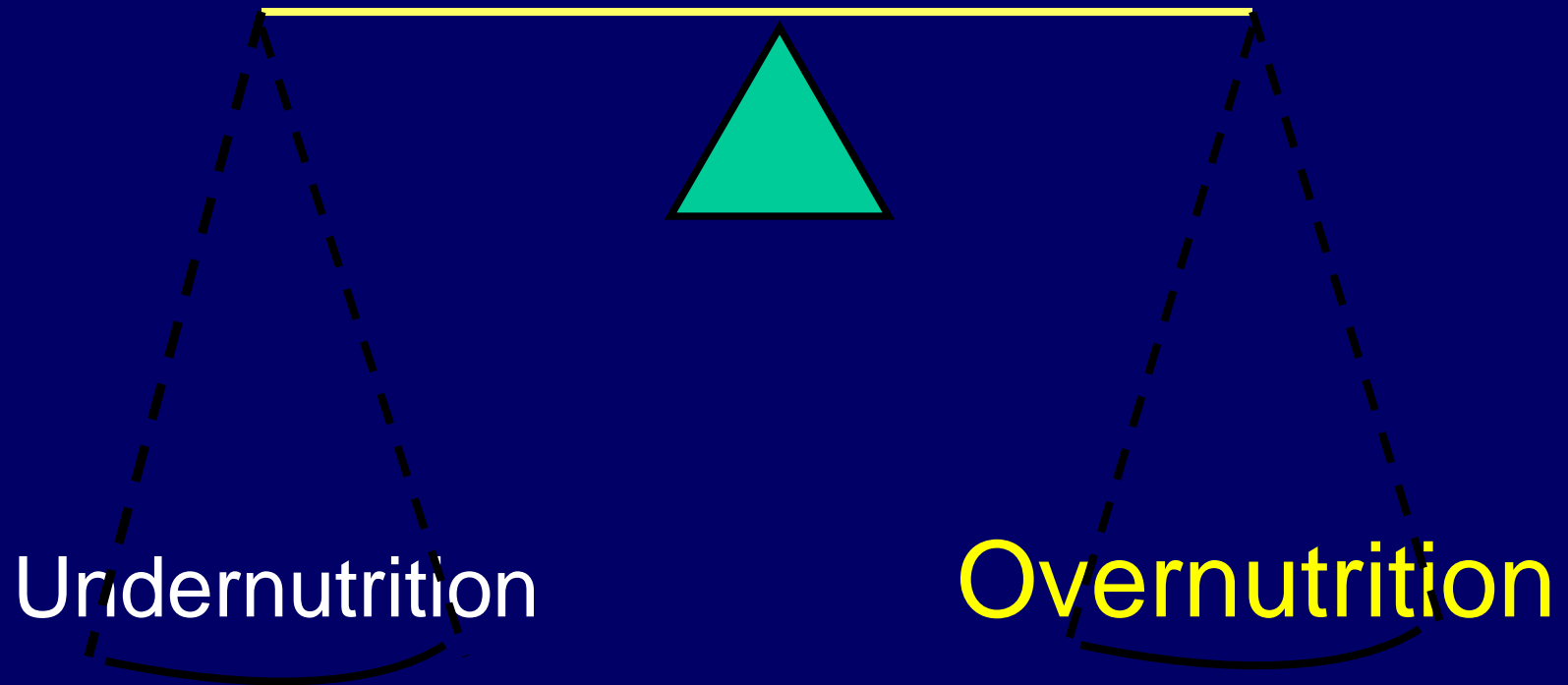


# The Cost of Undernutrition

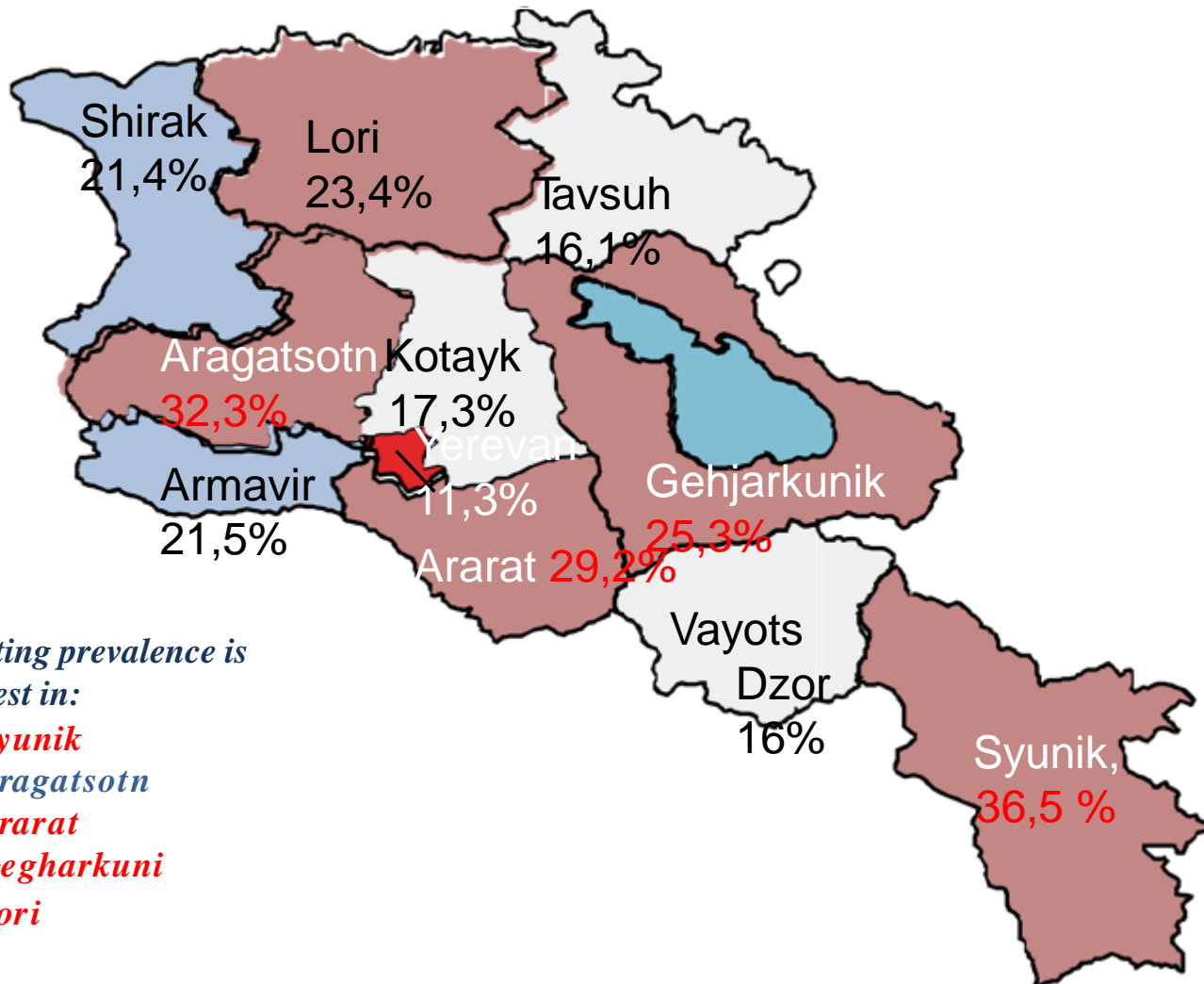
- There is evidence that **46 million years of productive, disability-free life were lost** in 1990, the result of lost social productivity caused by four types of malnutrition: **stunting** and disorders related to iodine, **iron** and vitamin A deficiency.

# NUTRITION

## *“The Double Burden”*



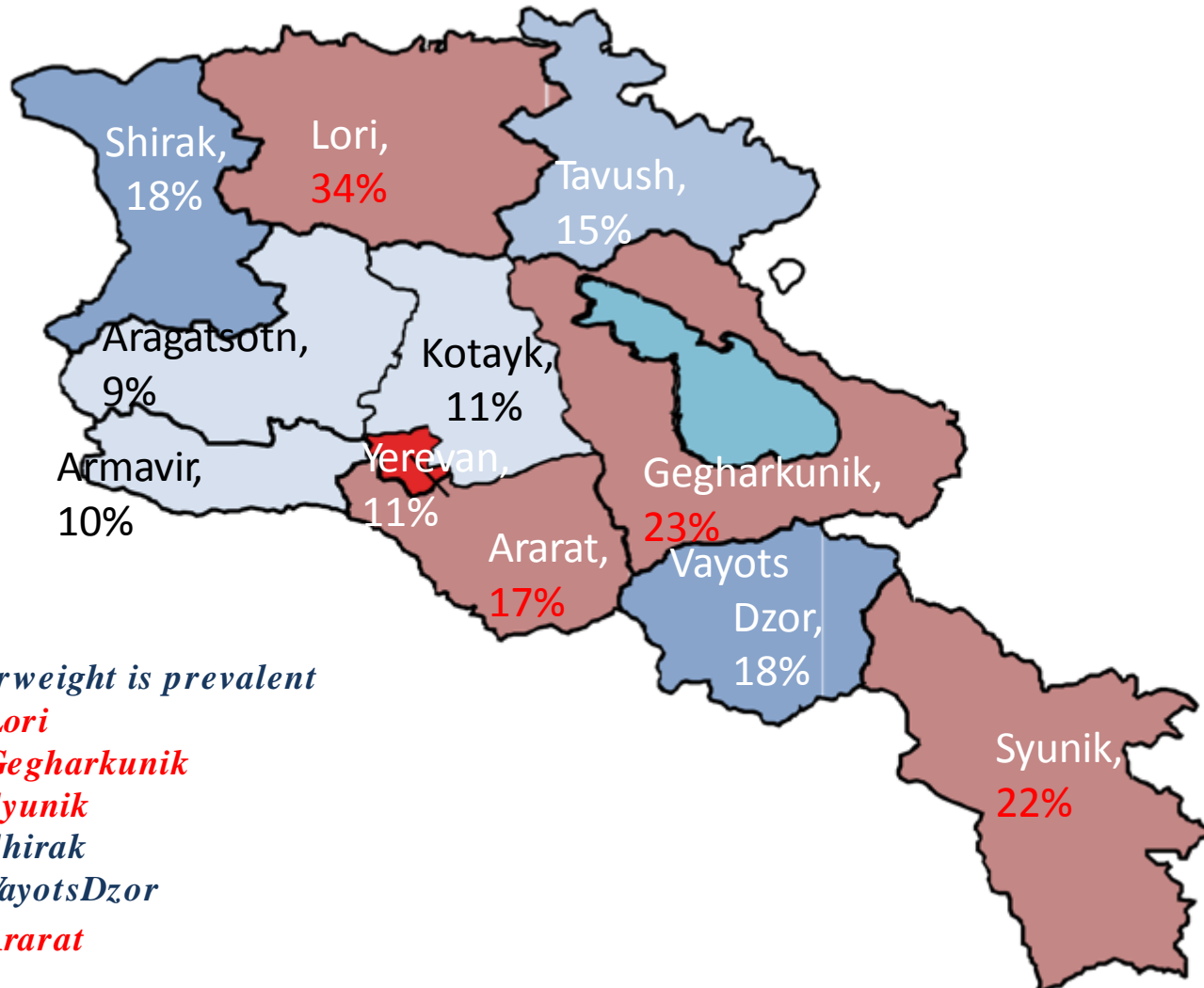
# Stunting Prevalence by Geographic Area (DHS-2010)



*Stunting prevalence is highest in:*

- **Syunik**
- **Aragatsotn**
- **Ararat**
- **Gegharkuni**
- **Lori**

# Overweight Prevalence by Geographic Area (DHS 2010)



# The Bill, Please

(for 5 chronic diseases for 20 years)

N.B. These numbers are TRILLIONS

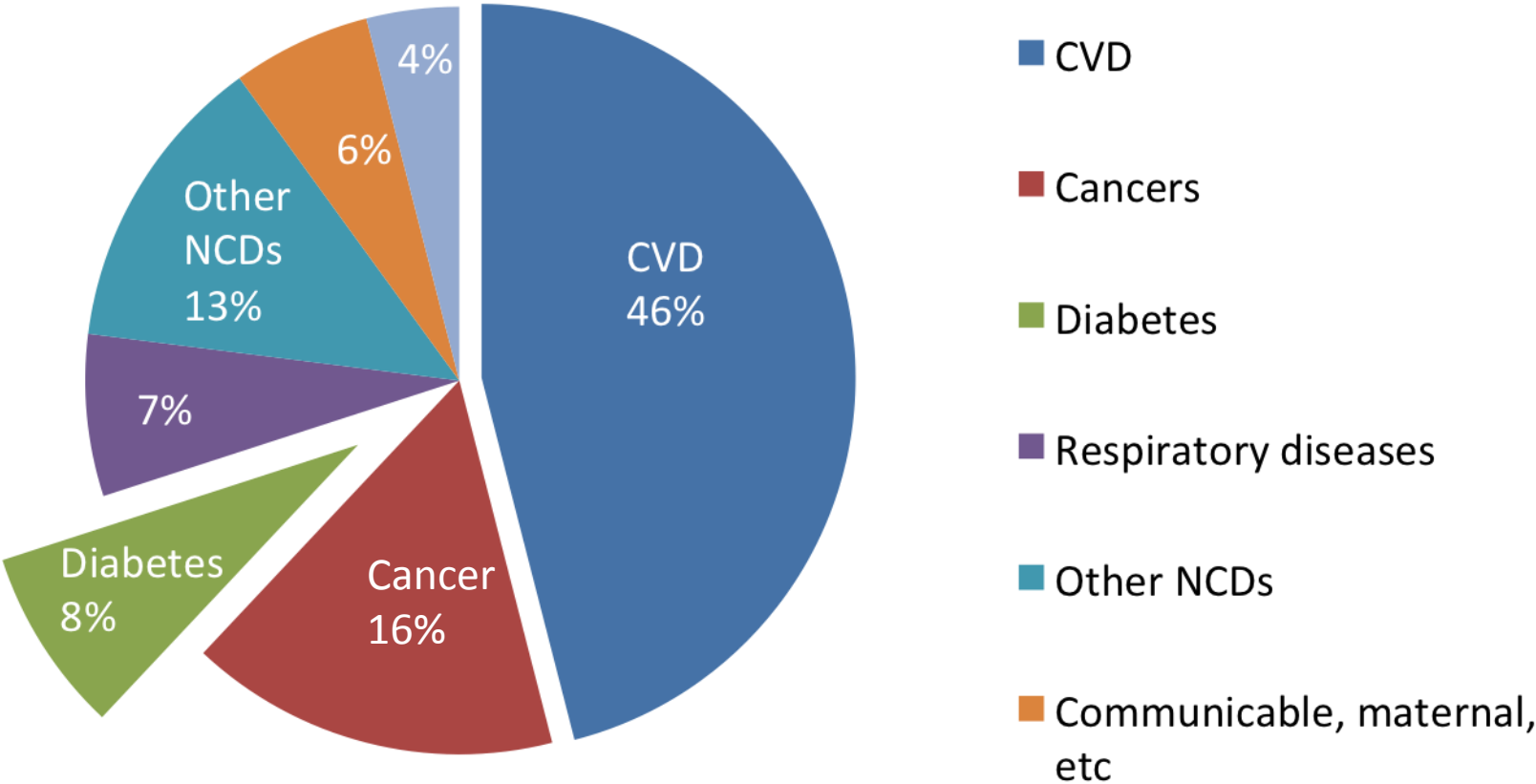
Table 14: The anticipated economic toll of NCDs is staggering  
 Economic burden of NCDs, 2011-2030 (trillions of US\$ 2010), based on EPIC model 1<sup>12</sup>

Country income group	Diabetes	Cardiovascular diseases	Chronic Respiratory diseases	Cancer	Mental Illness*	Total
High	0.9	8.5	1.6	5.4	9.0	25.5
Upper-middle	0.6	4.8	2.2	2.3	5.1	14.9
Lower-middle	0.2	2.0	0.9	0.5	1.9	5.5
Low	0.0	0.3	0.1	0.1	0.3	0.0
<b>LMIC</b>	<b>0.8</b>	<b>7.1</b>	<b>3.2</b>	<b>2.9</b>	<b>7.3</b>	<b>21.3</b>
<b>World</b>	<b>1.7</b>	<b>15.6</b>	<b>4.8</b>	<b>8.3</b>	<b>16.3</b>	<b>46.7</b>

\*The numbers for mental illness were obtained by relating the economic burden of all other diseases to their associated number of DALYs. Then the burden for mental illness was projected using the relative size of the corresponding DALY numbers to all the other conditions.

# NCDs Account For 90% of All Deaths, Armenia 2011

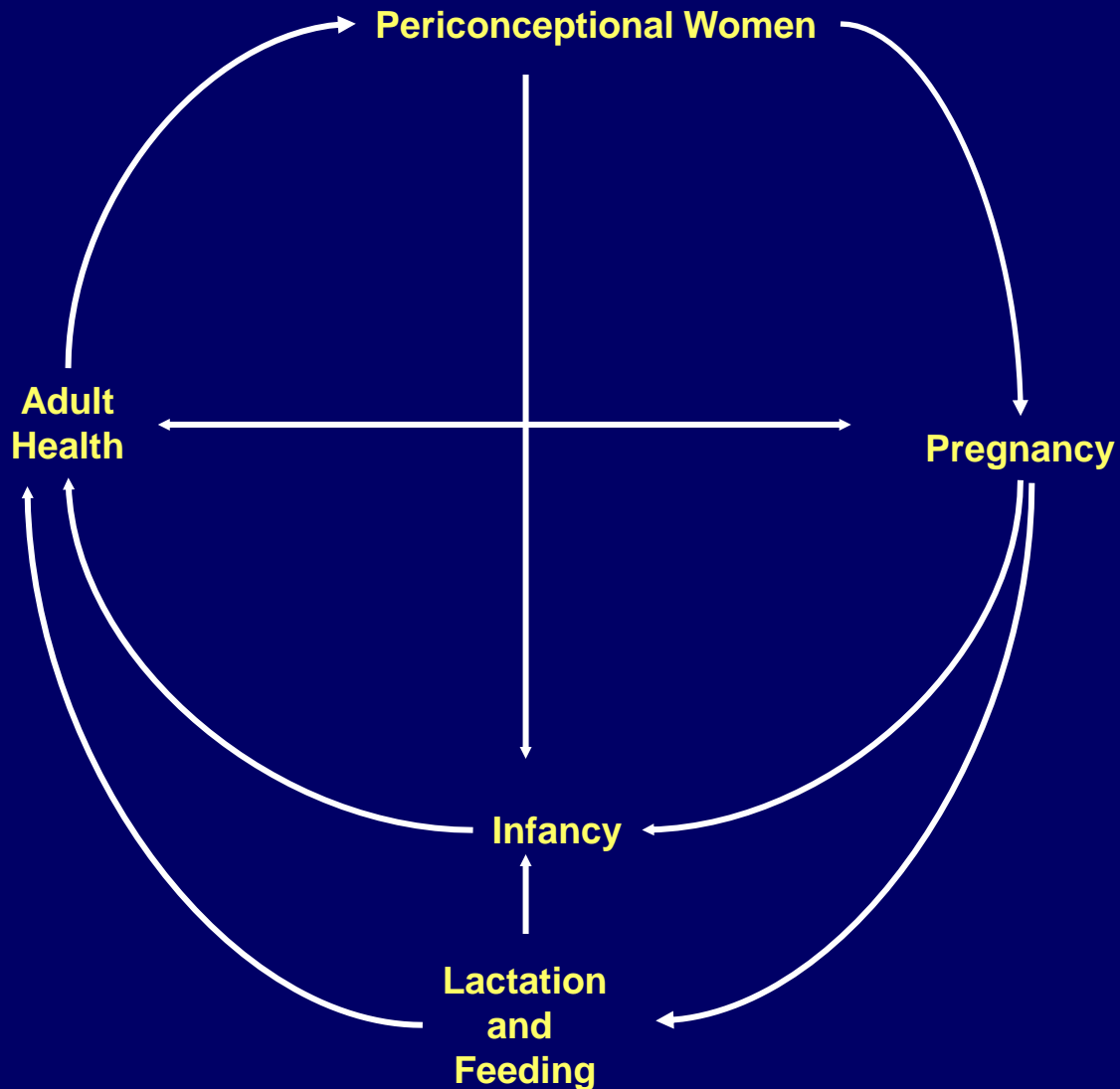
Proportional Mortality (% of total deaths, all ages)



**SOLUTIONS**

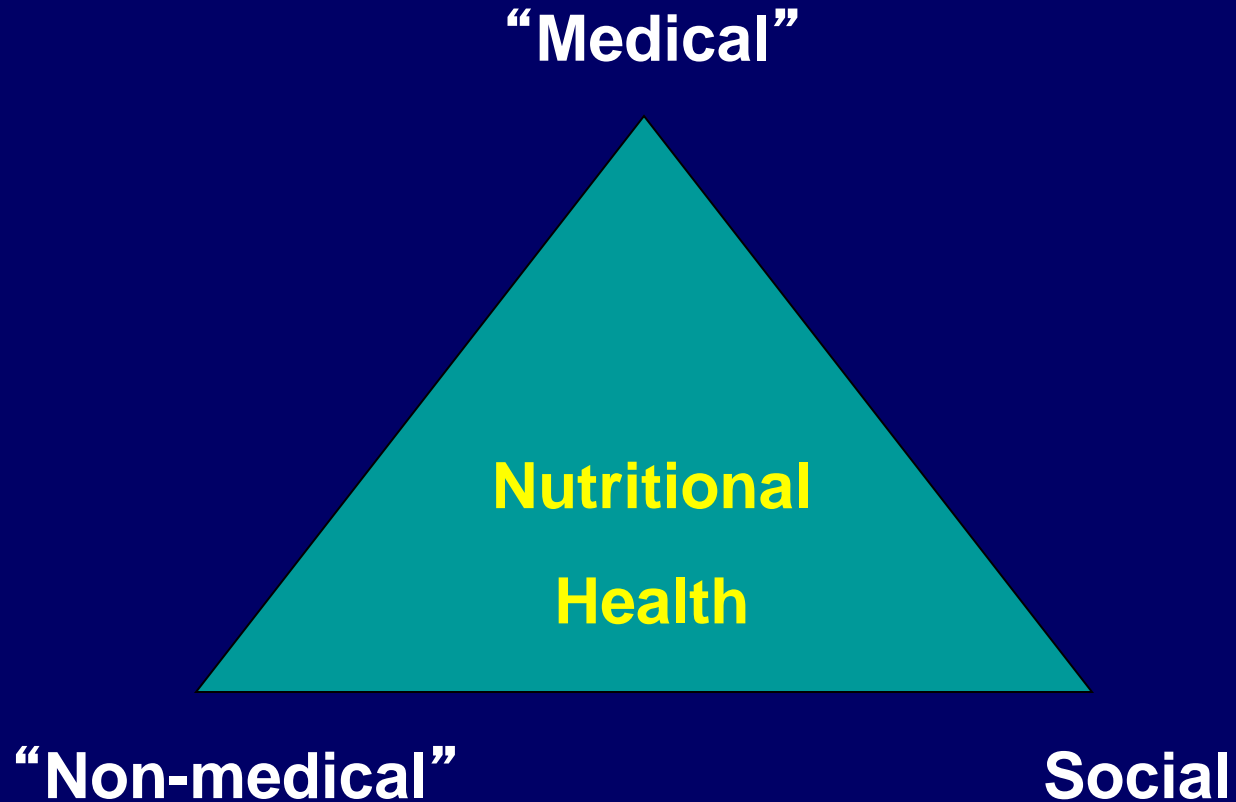
**?????**

# Lifecycle Nutrition Perspective





# Nutritional Health – Interacting Dimensions



# The benefit-cost ratios for nutrition programs

## Intervention programs

## Benefit-cost

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**Breastfeeding** promotion in hospitals

**5-67**

Integrated child care programs

**9-16**

**Iodine** supplementation (women)

**15-520**

Vitamin A supplementation (< 6 years)

**4-43**

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**Iron fortification** (per capita)

**176-200**

*Source: Behrman, Alderman, and Hoddinott (2004)*

# Serum Folate Levels in Palestinian Children

## *Effects of Flour Fortification*

- Median folate: 16.1 ng/ml
- 0.1% : <3.1 µg/L (Very low)
- 2.3% : <7.0 µg/L (NTD risk)
- 72.3%: 7-20 µg/L (Normal)
- 25.1% : >20 µg/L (High)
- 8.5% : >30 µg/L (High)

n = 1890

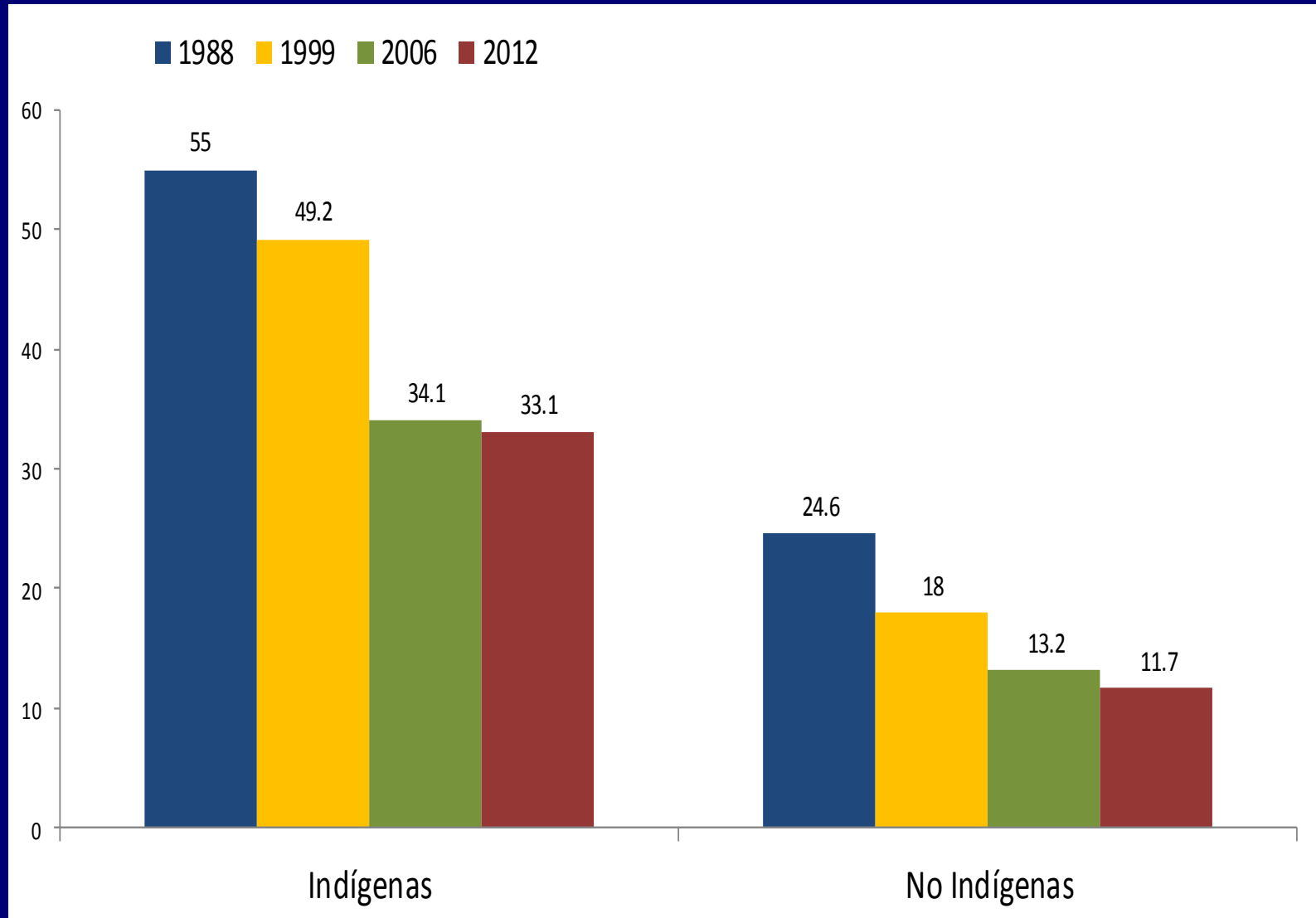
# Armenia – Estimates 2012 -2022

*- Costs of NOT addressing STUNTING and ANEMIA  
= \$175 million*

*- Costs of flour fortification with iron and folate  
= \$6.2 million*

# Decreases in < 5yr Stunting in Indigenous and Non-Indigenous Mexican Children -1988 to 2012

(Prof. Juan A. Rivera-Dommarco, INSP, 2012)



# Screening for “Treatable” Causes of Undernutrition in Armenia

- Poor breastfeeding practices
- Poor post weaning and childhood feeding practices
  
- Celiac disease
- Cow milk protein allergy
- Intestinal parasites
- Lead, arsenic toxicity
- ....., ....., .....

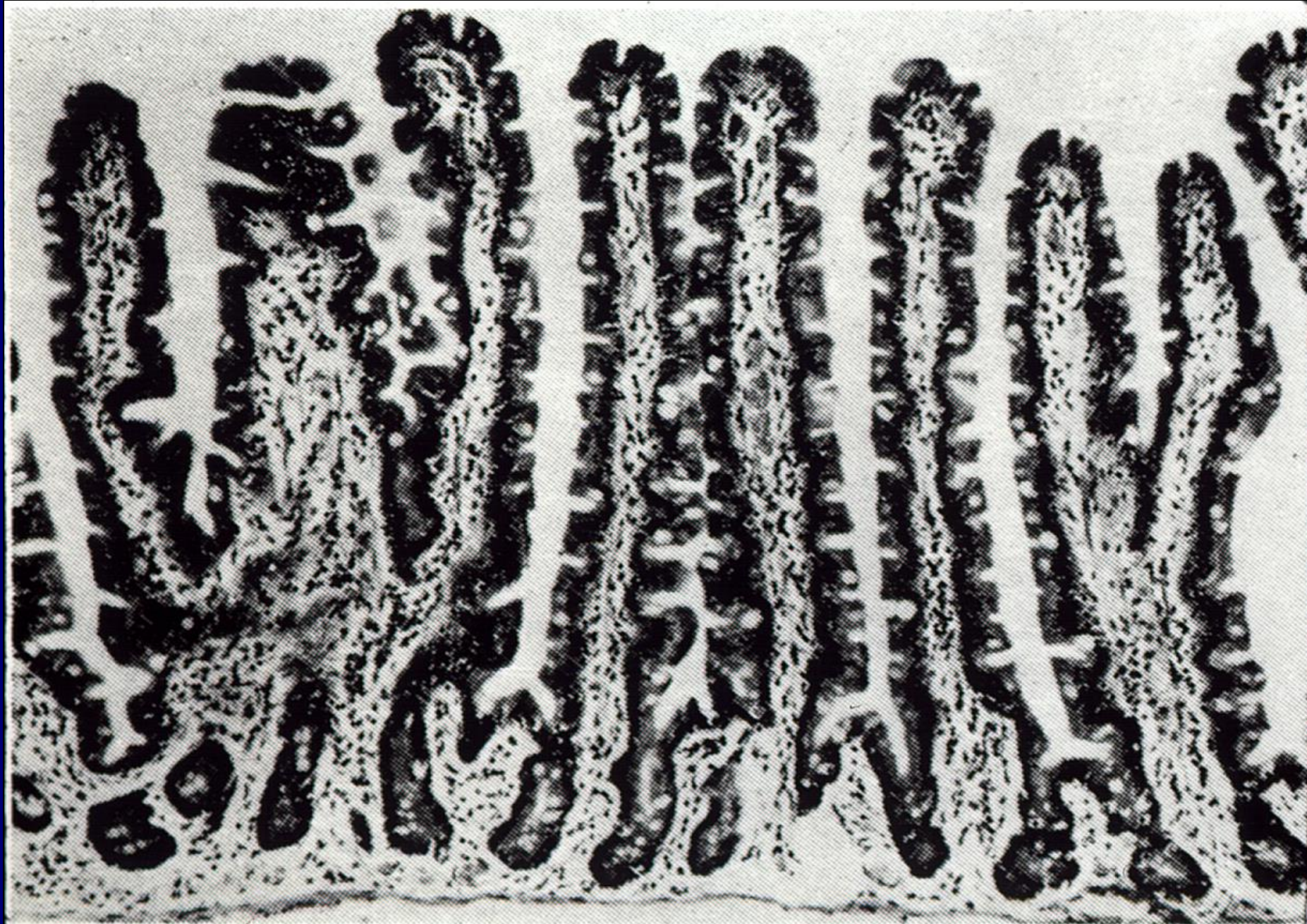
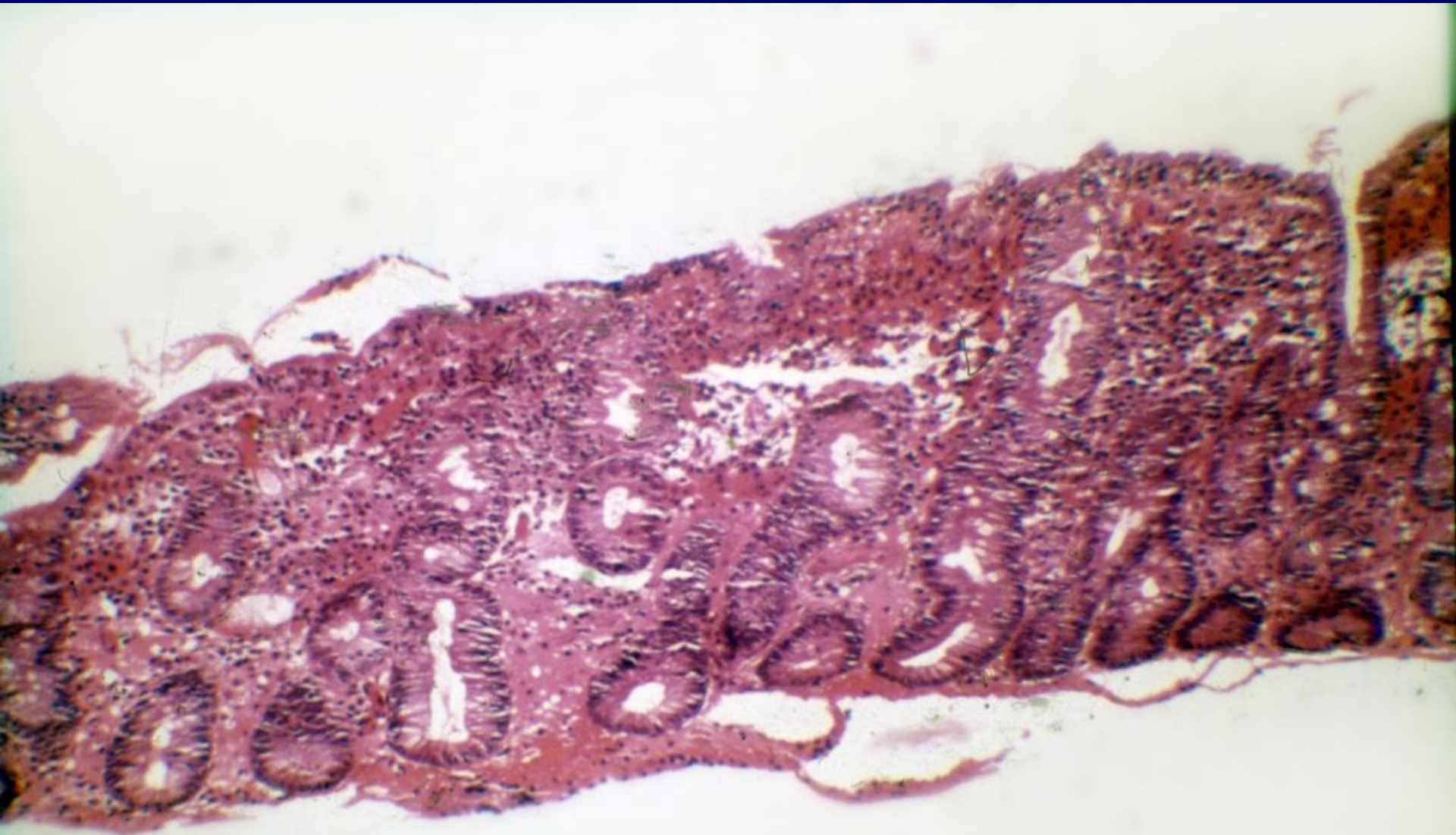


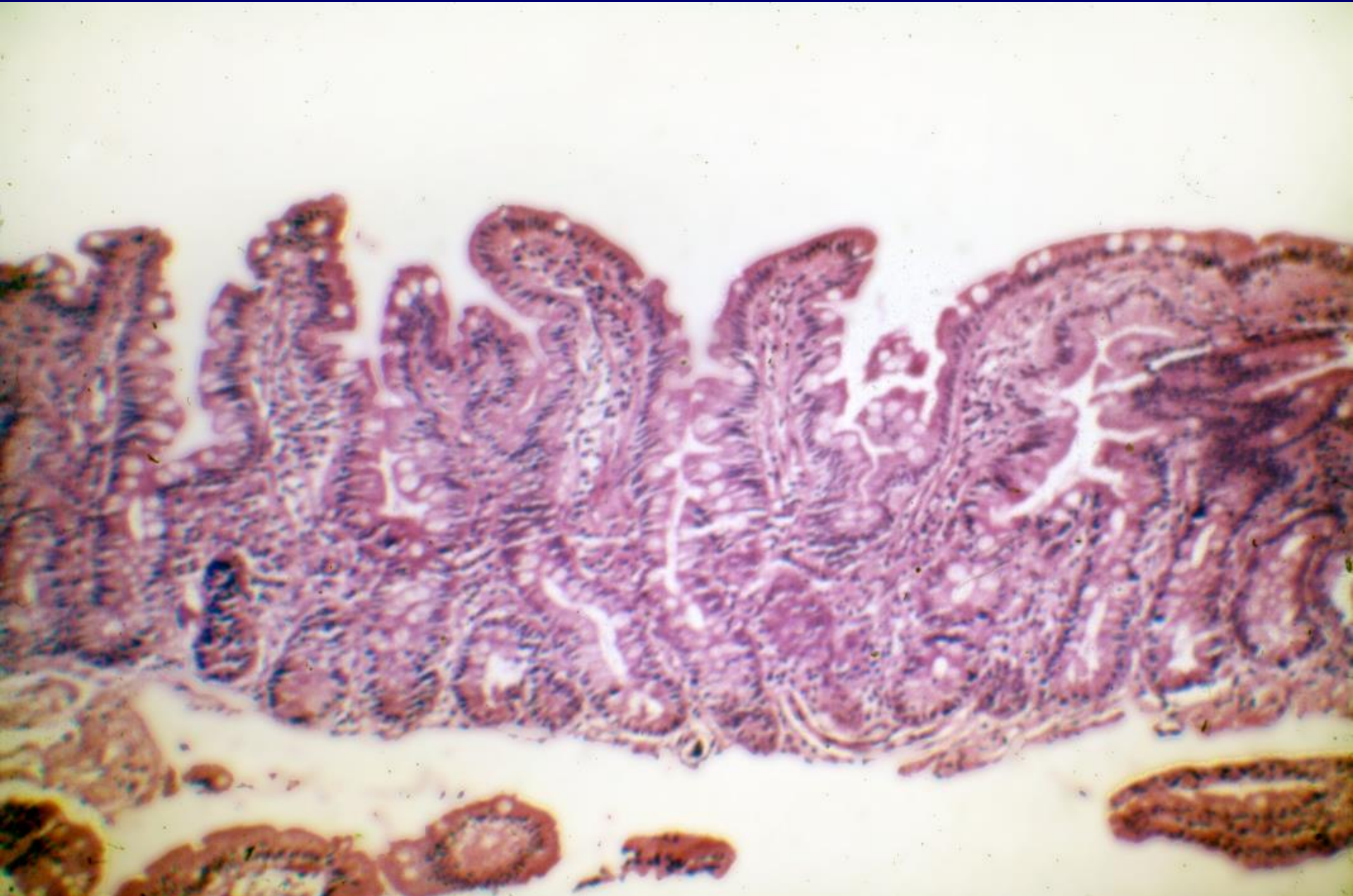
FIG. 2.—Histological appearance of normal jejunal mucosa. ( $\times 30$ .)

# Celiac Disease

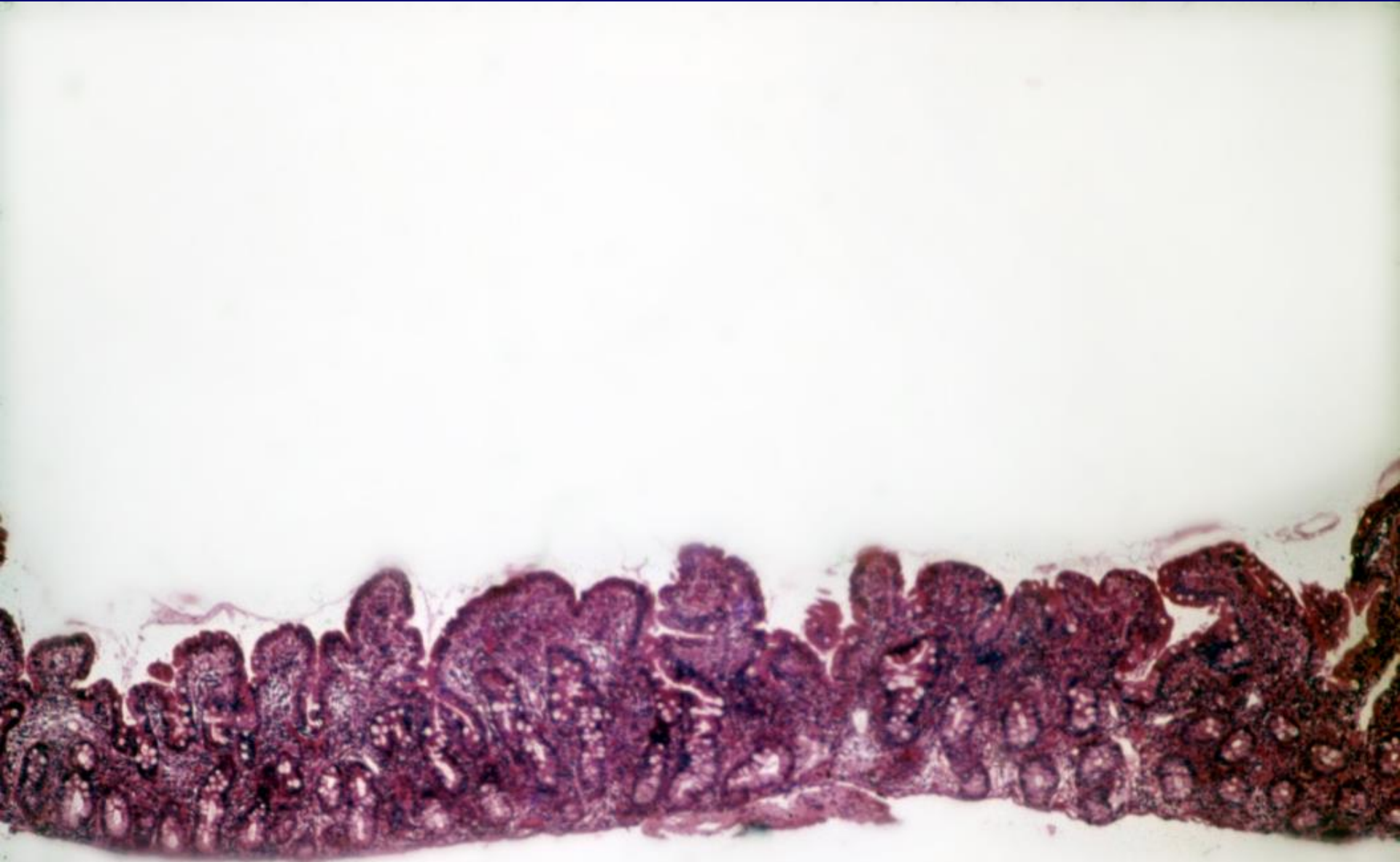




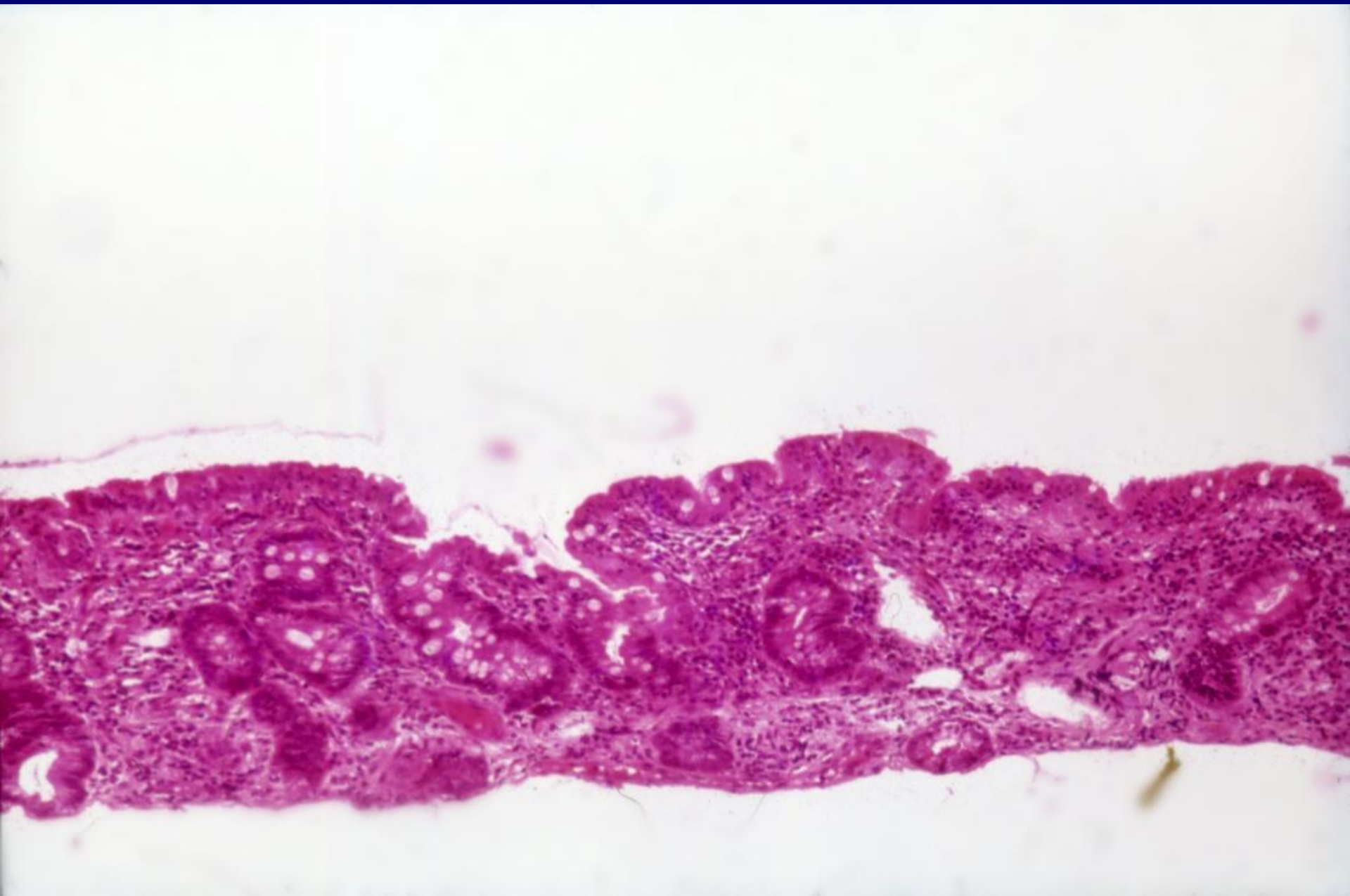
# Celiac Disease – Wheat Free Diet



# Cow Milk Protein Allergy



# Intestinal Parasites – *Giardia Lamblia*



# Cost of Obesity (USA)

**>\$150 billion/yr**

*How much does obesity cost in  
Armenia?*

# The Obesity Epidemic: Solutions

- **Individual** - .....
- **Community** –.....
- **Industry** – .....
- **Government** – .....

# Potential Economic Consequences

(USA)

## Impact of Delaying Disease Onset

<u>Disease</u>	<u>Savings/year - \$</u>
Cardiovascular disease (5 yr)	69,000,000,000
Stroke (5 yr)	15,000,000,000
Hip fracture (5 yr)	5,000,000,000
Cataracts (10 yr)	2,500,000,000
	<hr/>
	82,500,000,000

(J. Blumberg *in* Preventive Nutrition, 1997)



**What are the costs of doing nothing?**

