

**RELATIVE RISK(S) OF DIETARY/LIFESTYLE FACTORS  
AND RISK INDEX FOR SELECTED CHRONIC DISEASES  
AMONG OLDER ADULTS IN KOREA.**

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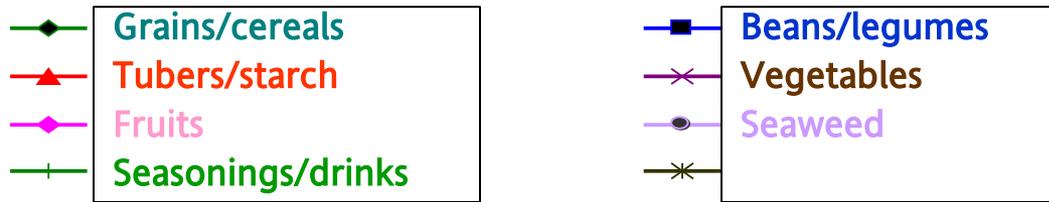
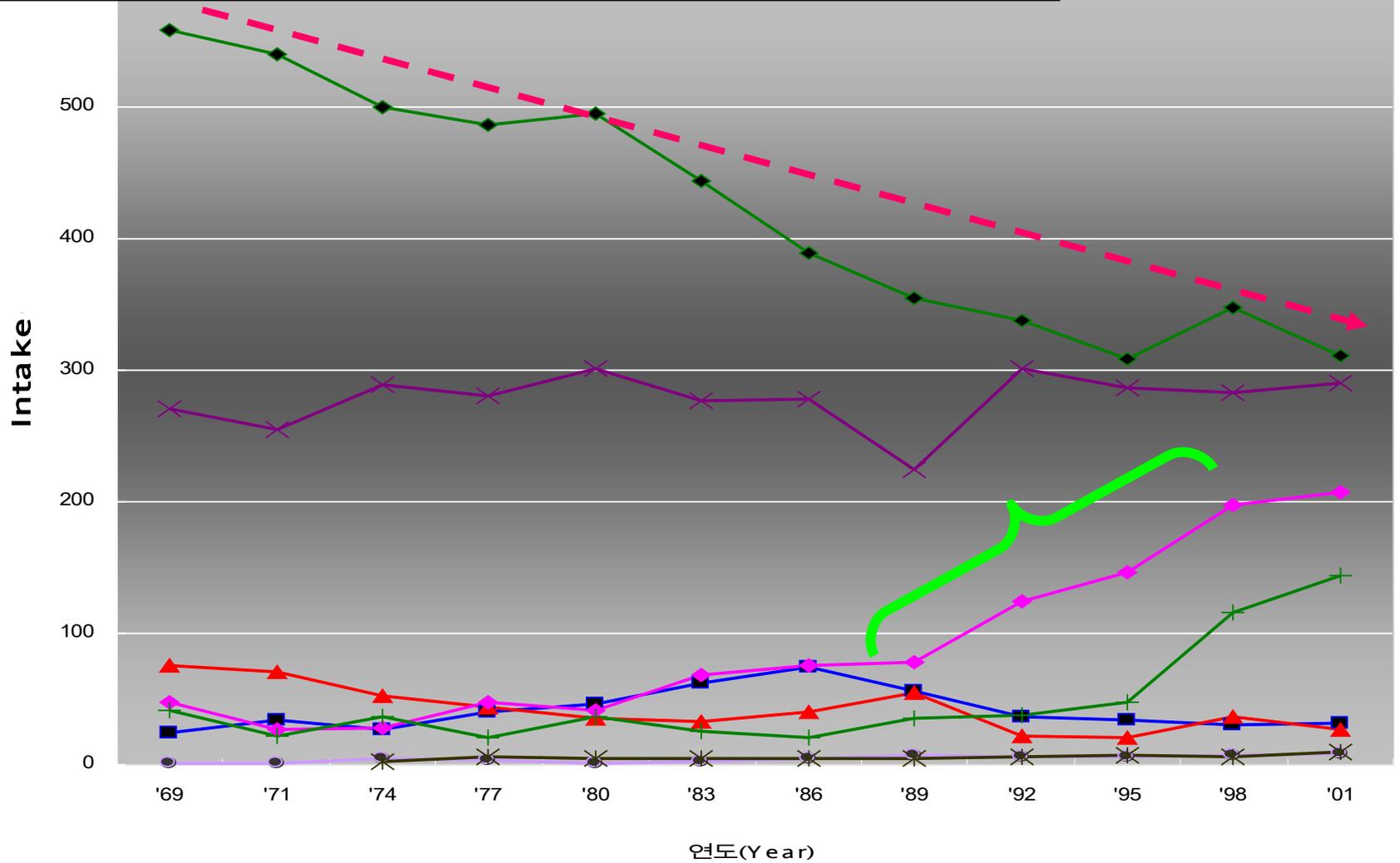
**Korea Health Industry Development Institute**

# OBEJECTIVES

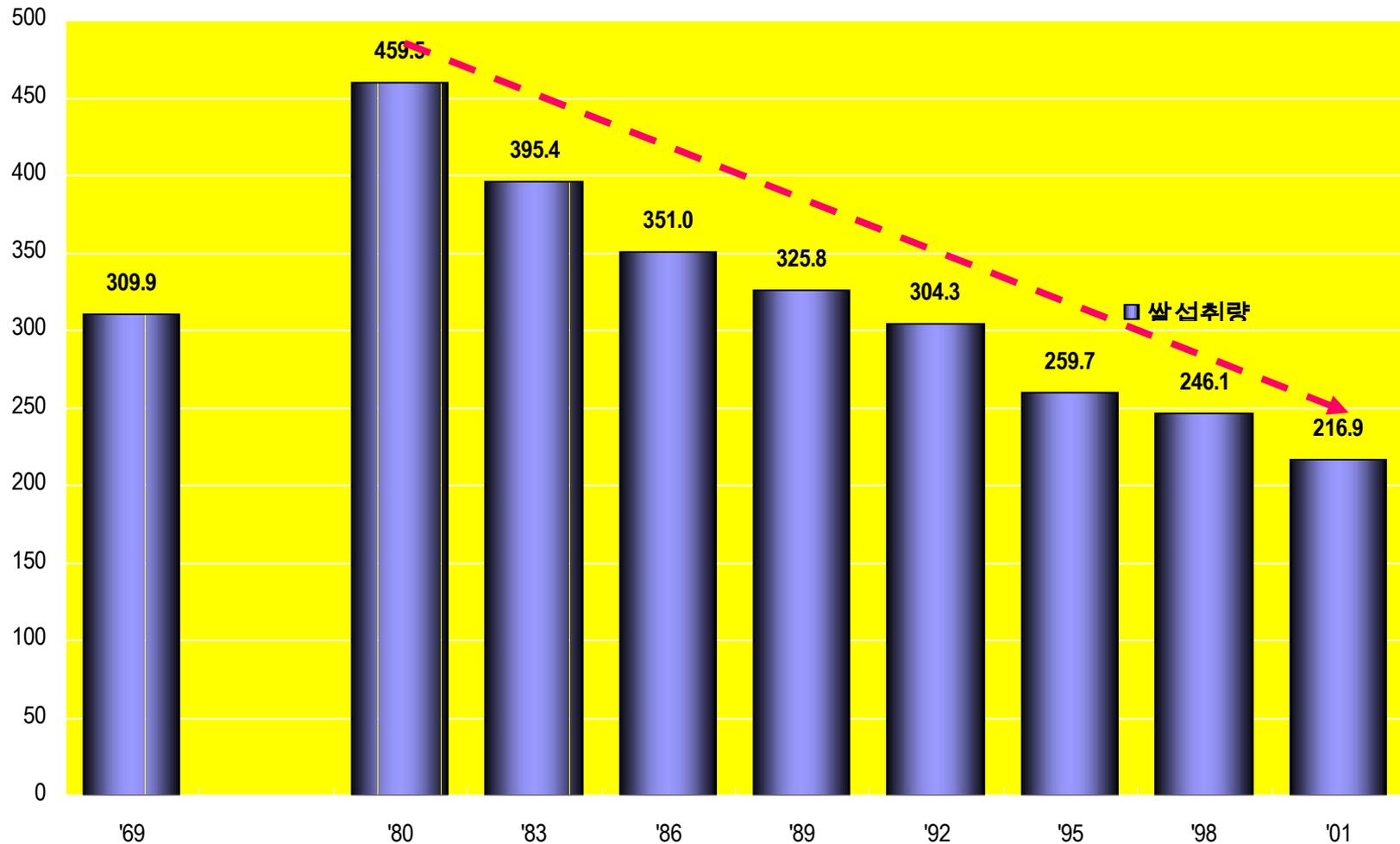
Increasing prevalence of chronic diseases made the early detection or recognition of the proneness to chronic diseases important in prevention and/or management of chronic diseases .

In the process of developing a **Risk Index for Chronic Diseases**, we looked into the nutrient/food intake and lifestyle factors of older adults in Korea.

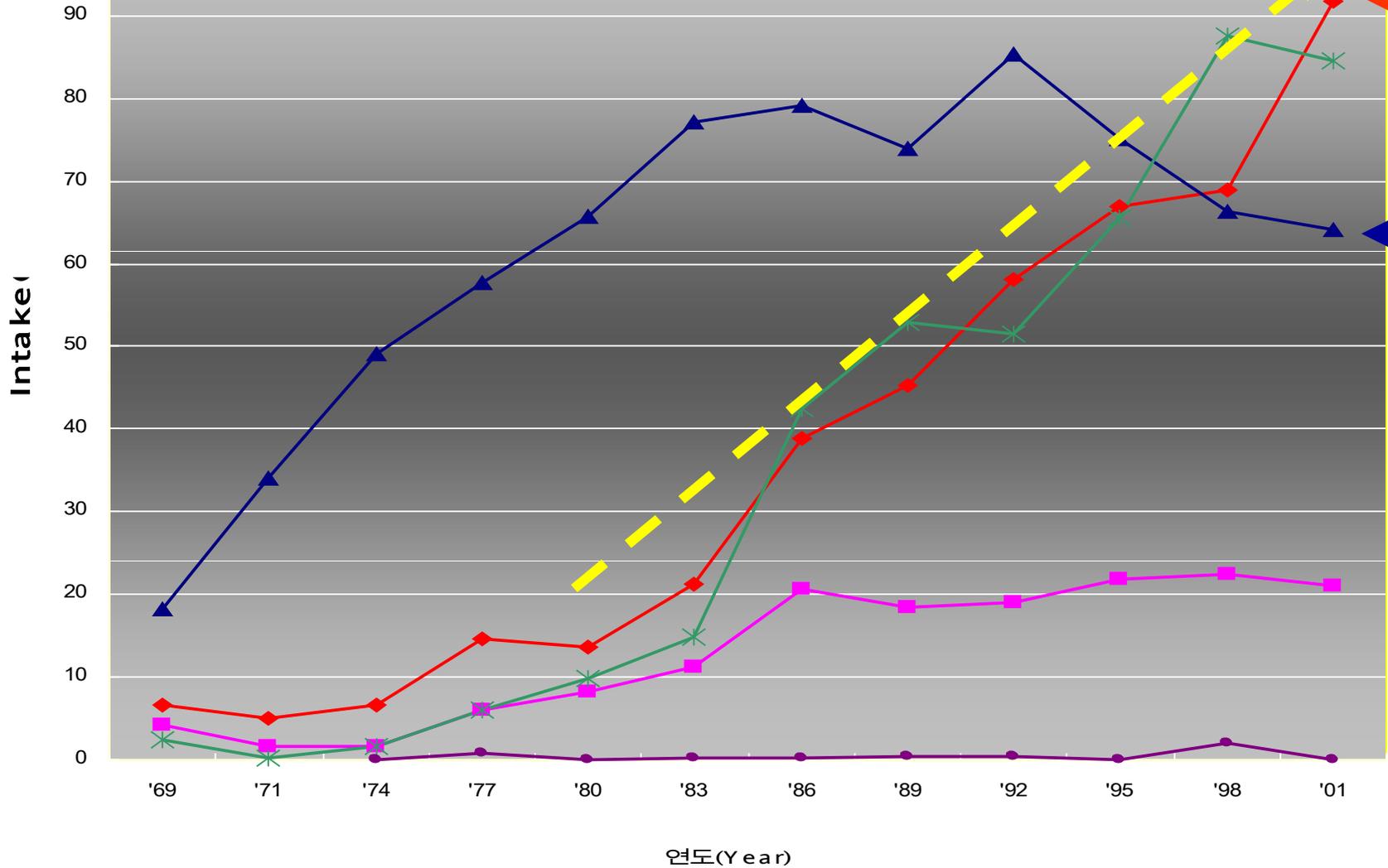
# Change in Plant Food Group Intake



# Change in rice intake (g)/capita/day



# Change in Animal Food Group Intake



◆ Meats/poultry

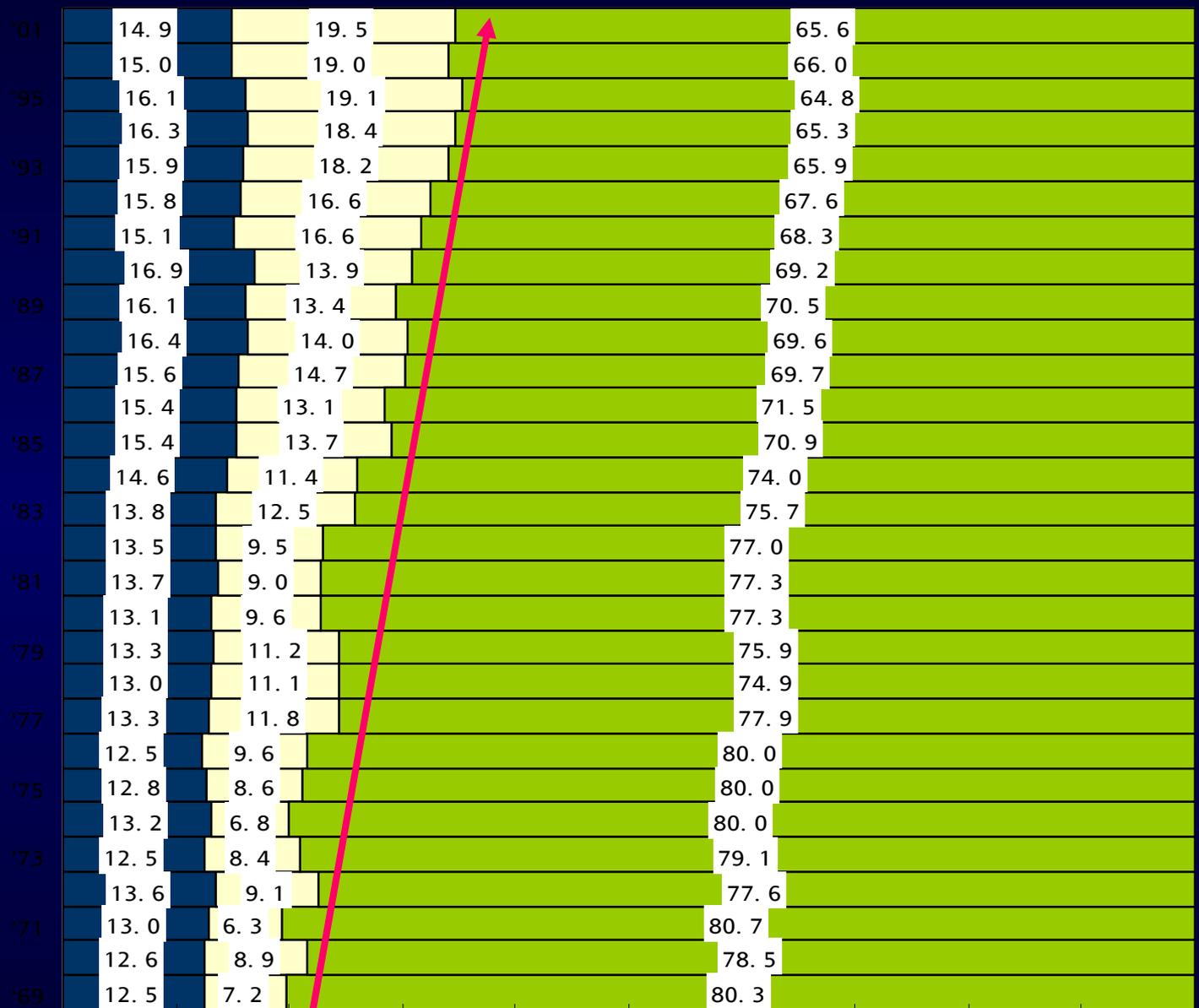
■ Eggs

▲ Fishes/shellfishes

\* Dairy products

● Fats & oils

# Change in protein, fat and carbohydrate driven energy ratio



0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

■ 단백질 (Protein) □ 지방 (Fat) ■ 당질 (Car)

# Typical Table Setting for a Meal

Grilled Beef



335 kcal 나트륨 523 mg

Kimchi (40g)



7 kcal 나트륨 458 mg

Spinach (cooked)



44 kcal 나트륨 562 mg

Rice w/ beans



335 kcal 나트륨 59 mg

Seaweed Soup



38 kcal 나트륨 821 mg

Total

759 kcal

Na

2427 mg

# MATERIALS & METHODS

Starting with data from the 1998 and 2001 National Health and Nutrition Surveys, nutrient intakes of **6,112 adults 40-64 years of age** were calculated using food composition database and matched with health examination records by individual ID.

To avoid any bias due to diet/lifestyle changes following recognition of disease(s), those diagnosed for disease(s) before the health exam were excluded, and relative risk (RR) of dietary and/or lifestyle factors was calculated.

# MATERIALS & METHODS

RR =  $\frac{\text{Incidence rate of disease in exposed}}{\text{incidence rate of disease in non-exposed}}$

Risk Scores: 1 for each risk factor w/ significance

# Chronic Diseases and Diagnostic Reference Used

Disease		Diagnosis Reference	
<b>Hypertension</b>	At Examination	Mean of 2 systolic BP measurements $\geq 140$ mmHg Or, Mean of 2 diastolic BP measurements $\geq 90$ mmHg	
	Under medication	Under anti-hypertensive medication at the time of examination	
<b>Diabetes</b>	At Examination	Fasting blood glucose $126$ mg/ dℓ & over (Glucose intolerance: $110 \sim 125$ mg/ dℓ )	
	Under medication	Under diabetic medication at the time of examination	
<b>Anemia</b>	10-11 years	Hemoglobin $< 115$ g/ℓ and Hematocrit $< 0.34$ ℓ/ℓ	
	12-14 years	Hemoglobin $< 120$ g/ℓ and Hematocrit $< 0.36$ ℓ/ℓ	
	15 years and up	non-pregnant woman	Hemoglobin $< 120$ g/ℓ and Hematocrit $< 0.36$ ℓ/ℓ
		pregnant woman	Hemoglobin $< 110$ g/ℓ and Hematocrit $< 0.33$ ℓ/ℓ
		man	Hemoglobin $< 130$ g/ℓ and Hematocrit $< 0.39$ ℓ/ℓ
<b>Hyperlipidemia</b>	Hypercholesterolemia	Serum total cholesterol $\geq 240$ mg/ dℓ (For 19 years and under, total cholesterol $\geq 200$ mg/ dℓ )	
	Hypertriglyceridemia	Serum triglyceride $\geq 200$ mg/ dℓ	
<b>Overweight</b>	Overweight class I	$25 \leq \text{BMI}$	
	Overweight class II	$25 \leq \text{BMI} < 28$	

## Number of Subjects Whose Data was Used in Analysis

Year	Total	Male	Female
<b>Total</b>	6,112	2,900	3,212
<b>1998</b>	3,111	1,473	1,638
<b>2001</b>	3,001	1,427	1,574

# RESULTS



# Relative risk of relevant factors to hypertension

Factor	Analysis	RR
Education	Up to 11th grade / 12th grade and higher	1.7509
Income	Under 100% MMLE / 100% MMLE and higher	1.5329
Dietary variety (No. of foods)	Under 30 items / 30 items and higher	1.2128
Low intake of nutrients <sup>1)</sup>	Low-intake / Others except over-intake	1.1875
Family history	Yes / No	1.1249
Meats/fishes/eggs/beans intake	Under recommended servings (RS) / RS and higher	1.0745
Vegetable intake	Under recommended servings (RS) / RS and higher	1.0711
Fruits intake	Under recommended servings (RS) / RS and higher	1.0513
Grains/cereals intake	Under recommended servings (RS) / RS and higher	0.8980
Rice intake per day	Under 180g / 180g and higher	0.7979
BMI	BMI under 25 / BMI 25 and higher	0.7732
Serum total cholesterol	Under 240 mg / dℓ / 240 mg / dℓ and higher	0.7311
Abdominal obesity (waist circumference)	Under 90 cm / 90 cm and up for man, Under 85 cm / 85 cm and up for woman	0.6952
Fasting blood glucose	Under 126 mg / dℓ / 126 mg / dℓ and higher	0.5947
Daily physical activity level	Moderate and under / high and up	0.5933
Area of residence	City area / rural area	0.5621
Health insurance	Self supported / Employer supported	0.2535

## Relative risk of relevant factors to diabetes

Factor	Analysis	RR
Menopause	Yes / No	2.5055
Education	Up to 11th grade / 12th grade and higher	1.9190
Dietary variety (No. of foods)	Under 30 items / 30 items and higher	1.3093
Family history	Yes / No	1.0495
Meats/fishes/eggs/beans intake	Under recommended servings (RS) / RS and higher	1.0177
Rice intake per day	Under 180g / 180g and higher	0.7657
Area of residence	City area / rural area	0.7343
Health insurance	Self supported / Employer supported	0.6634
BMI	BMI under 25 / BMI 25 and higher	0.4719
Serum total cholesterol	Under 240 mg / dL / 240 mg / dL and higher	0.4123
Blood pressure	Systolic BP under 120 mm Hg or diastolic BP under 80 mm Hg / Others	0.3863
Abdominal obesity (waist circumference)	Under 90 cm / 90 cm and up for man, Under 85 cm / 85 cm and up for woman	0.3711

# Relative risk of relevant factors to hyperlipidemia

Factor	Analysis	RR
Menopause	Yes / No	2.8332
Education	Up to 11th grade / 12th grade and higher	1.5863
Income	Under 100% MMLE / 100% MMLE and higher	1.3357
Dietary variety (No. of foods)	Under 30 items / 30 items and higher	1.1677
Low intake of nutrients <sup>1)</sup>	Low-intake / Others except over-intake	1.1284
Kimchi intake per day	Under 90g / 90g and up	1.1228
Meats/fishes/eggs/beans intake	Under recommended servings (RS) / RS and higher	1.0490
Grains/cereals intake	Under recommended servings (RS) / RS and higher	0.9616
Gender	Male / female	0.8855
Regular Sports activity	Yes / No	0.8807
Rice intake per day	Under 180g / 180g and higher	0.8335
Area of residence	City area / rural area	0.6619
Health insurance	Self supported / Employer supported	0.6246
BMI	BMI under 25 / BMI 25 and higher	0.5689
Fasting blood glucose	Under 126 mg / dl / 126 mg / dl and higher	0.5287
Abdominal obesity (waist circumference)	Under 90 cm / 90 cm and up for man, Under 85 cm / 85 cm and up for woman	0.5180
Blood pressure	Systolic BP under 120 mm Hg or diastolic BP under 80 mm Hg / Others	0.4240

## Relative risk of relevant factors to anemia

Factor	Analysis	RR
<b>BMI</b>	BMI under 25 / BMI 25 and higher	3.3453
<b>Abdominal obesity (waist circumference)</b>	Under 90 cm / 90 cm and up for man, Under 85 cm / 85 cm and up for woman	3.0421
<b>Serum total cholesterol</b>	Under 240 mg / dℓ / 240 mg / dℓ and higher	2.9373
<b>Fasting blood glucose</b>	Under 126 mg / dℓ / 126 mg / dℓ and higher	2.4846
<b>Menopause</b>	Yes / No	1.6818
<b>Blood pressure</b>	Systolic BP under 120 mm Hg or diastolic BP under 80 mm Hg / Others	1.5689
<b>Marriage</b>	Not married or widowed / married	1.3933
<b>Low energy/iron intake</b>	Energy intake < 75% of EER & iron intake < EAR / energy intake ≥ 75% of EER & iron intake ≥ EAR	1.3205
<b>Rice intake per day</b>	Under 180g / 180g and higher	1.2808
<b>Daily physical activity level</b>	Moderate and under / high and up	1.1672
<b>Fruits intake</b>	Under recommended servings (RS) / RS and higher	1.0190
<b>Grains/cereals intake</b>	Under recommended servings (RS) / RS and higher	0.9825
<b>Regular Sports activity</b>	Yes / No	0.7223

## Relative risk of relevant factors to overweight I

Factor	Analysis	RR
Menopause	Yes / No	1.3606
Education	Up to 11th grade / 12th grade and higher	1.2044
Milk intake per day	Under 200 Mℓ / 200 Mℓ and higher	1.1794
Daily physical activity level	Moderate and under / high and up	1.1493
Health insurance	Self supported / Employer supported	1.0951
Fruits intake	Under recommended servings (RS) / RS and higher	0.9565
Vegetable intake	Under recommended servings (RS) / RS and higher	0.9507
Sodium intake per day	Under 4000 mg / 4000 mg and higher	0.9110
Income	Under 100% MMLE / 100% MMLE and higher	0.8924
Kimchi intake per day	Under 90g / 90g and up	0.8857
Gender	Male / female	0.8467
Cigarette smoking	Yes / No	0.8076

## Relative risk of relevant factors to overweight II

Factor	Analysis (25-28)	RR
Menopause	Yes / No	1.3280
Milk intake per day	Under 200 Ml / 200 Ml and higher	1.3034
Education	Up to 11th grade / 12th grade and higher	1.1965
Daily physical activity level	Moderate and under / high and up	1.1374
Dairy product intake	Under recommended servings (RS) / RS and higher	1.0959
Fruits intake	Under recommended servings (RS) / RS and higher	0.9630
Vegetable intake	Under recommended servings (RS) / RS and higher	0.9458
Sodium intake per day	Under 4000 mg / 4000 mg and higher	0.9118
Income	Under 100% MMLE / 100% MMLE and higher	0.8953
Kimchi intake per day	Under 90g / 90g and up	0.8731
Cigarette smoking	Yes / No	0.7805

## Comparison of risk scores for CD between 2 groups

Disease	Patients		Non-patients		p
	Mean	SD	Mean	SD	
Hypertension	7.95	2.27	6.60	2.19	p<0.001
Diabetes	5.99	1.76	4.87	1.72	p<0.001
Hyperlipidemia	8.65	2.57	7.18	2.38	p<0.001
Anemia	8.90	1.56	8.12	1.67	p<0.001
Overweight I	6.86	1.46	6.59	1.43	p<0.001
Overweight II	6.50	1.36	6.18	1.36	p<0.001

# Distribution of risk score for hypertension

Percentile	Estimated score	
	Patients	Non-patients
100th	15	14
99th	13	11
95th	11	10
90th	11	9
75th Q3	10	8
50th median	8	7
25th Q1	6	5
10th	5	4
5th	4	3
1st	3	2
Minimum	1	0
mean	7.950	6.596

# Distribution of risk score for diabetes

Percentile	Estimated score	
	Patients	Non-patients
100th	10	11
99th	10	9
95th	9	8
90th	8	7
75th Q3	7	6
50th median	6	5
25th Q1	5	4
10th	4	3
5th	3	2
1st	2	1
Minimum	1	0
mean	5.988	4.873

# Distribution of risk score for hyperlipidemia

Percentile	Estimated score	
	Patients	Non-patients
100th	16	16
99th	14	13
95th	13	11
90th	12	10
75th Q3	11	9
50th median	9	7
25th Q1	7	5
10th	5	4
5th	4	4
1st	3	2
Minimum	1	1
mean	8.654	7.176

## Distribution of risk score for anemia

Percentile	Estimated score	
	Patients	Non-patients
100th	12	13
99th	12	12
95th	11	11
90th	11	10
75th Q3	10	9
50th median	9	8
25th Q1	8	7
10th	7	6
5th	6	5
1st	4	4
Minimum	3	1
mean	8.902	8.121

# Distribution of risk score for overweight

Percentile	Estimated score	
	Patients	Non-patients
100th	11	11
99th	10	10
95th	9	9
90th	9	8
75th Q3	8	8
50th median	7	7
25th Q1	6	6
10th	5	5
5th	4	4
1st	4	3
Minimum	1	2
mean	6.856	6.600

# SIGNIFICANCE

Further refinement in selecting nutritional/dietary factors to set a cutoff point of Risk Index for Chronic Disease(s) with reasonable sensitivity and predictability for each disease incidence would make the index useful in preventing chronic diseases under surveillance.

\* Supported by the R&D fund of MOHW

**THANK YOU!**

