DOCUMENT RESUME

ED 217 039 SP 020 368

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TITLE A Statewide Nutrient Analysis of Children's Diets.
PUB DATE 82
NOTE 14p.; Paper presented at the Annual Meeting of the American Educational Research Association (New York, NY, March, 1982).

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Administrator Attitudes; Curriculum Development; Eating Habits; Elementary Secondary Education; *Food Service; Health Education; Knowledge Level; Needs Assessment; Nutrition; *Nutrition Instruction; *Parent Attitudes; Physical Health; School Community Relationship; *Student Attitudes; *Teacher Attitudes; Teacher Education
IDENTIFIERS *Hawaii

ABSTRACT

A statewide assessment of the nutrition education and training needs of children, teachers, and food service personnel in Hawaiian schools was conducted through surveys of administrators, teachers, food service managers, school nurses, students, parents, community agencies, an evaluation of classroom materials, a literature search, and a 24-hour student diet recall. The literature search and data collection revealed several nutrition-related health and dietary problems of children in Hawaii. Nutrition education was found to be lacking especially at the senior high school level, the grade level at which students also had the poorest diets. Parents felt that nutrition education was important in both the home and school, although some indicated they did not always set a good example for their children. Preschool and lower elementary teachers were more involved in nutrition education than were other teachers; however, many did not take nutrition-related coursework as part of their training. Teachers at all levels generally felt that students were interested in nutrition, parents were not resistant, and cost was not a limiting factor in conducting nutrition education. Administrators teachers, and food service managers agreed that coordination of classroom nutrition activities with the food service program is needed but rarely carried out. It is recommended that training for teachers must provide not only nutrition information but also teaching strategies and support services for improving students' eating habits. It is also recommended that food managers receive training in managerial skills and that training in nutrition should be provided for school nurses and health aides. (JD)

A STATEWIDE NUTRIENT ANALYSIS OF CHILDREN'S DIETS

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Paper presented at the annual meeting of the American Educational Research Association, New York, 1982.

Results of the Hawai'i Nutrition Education Needs Assessment: Some Unexpected Findings

Introduction

This paper discusses the results from a study which is described in detail in the lengthy final report of the Hawai'i Nutrition Education Needs Assessment (Lai & Shimabukuro, 1980) which was conducted for the Hawai'i State Department of Education by the Curriculum Research and Development Group, University of Hawai'i. Readers interested in methodology, instruments, or more details should consult the full document.

The Needs Assessment was conducted with funds from the U.S. Department of Agriculture (USDA) Nutrition Education and Training (NET) Program. The major objective of the assessment was to provide data for use in the planning and development of a comprehensive nutrition education plan for the State of Hawai'i. The needs assessment addressed 15 requirements set forth by the USDA in the final regulation (44 F.R. 28280) dated May 15, 1979. Because a statewide needs assessment had never been conducted before, results could not be directly compared with earlier findings; nonetheless, many of the results were unexpected.

Student Diet Recall

Data based on what 890 students indicated they had eaten during a 24-hour recall period showed a general decrease in the nutritional quality of diets as the students got older. Secondary level (grades 7-12) females had by far the poorest diets, which were evaluated according to the U.S. Recommended Dietary Allowances (RDA) (1980). Major problem areas were iron (77% of senior high school (grades 10-12) females and 73% of junior high school (grades 7-9) females had intakes less than two-thirds of the Recommended Dietary Allowances), calcium (70% of high school females and 66% of junior high school females had diets which contained less than two-thirds of the RDA), and vitamin A (more than half of the secondary females, as well as the junior high school males, had intakes less than two-thirds of the RDA). Table 1 shows the percentage of students in each of the age-sex groups whose nutrient intake was below two-thirds of the RDA for a given nutrient.

Table 1. Percentage of students below two-thirds of the RDA

Group	N	Mean Age	Nutrient								
			Protein	Vitamin A	Thiamin (B_1)	Riboflavin (B_2)	Niacin	Vitamin C	Calcium	Phosphorus	Iron
Elementary Males	170	10	0%	35%	32%	8%	20%	25%	22%	4%	9%
Elementary Females	159	10	1%	42%	40%	14%	31%	27%	29%	6%	13%
Jr. High Males	145	13	1%	56%	39%	9%	23%	37%	40%	9%	49%
Jr. High Females	137	13	3%	57%	36%	16%	28%	35%	66%	26%	73%
Sr. High Males	164	16	3%	40%	33%	15%	18%	32%	38%	16%	38%
Sr. High Females	115	16	6%	59%	37%	21%	28%	33%	70%	32%	77%

In comparison to the recommended energy intakes listed in Recommended Dietary Allowances (1980), the mean caloric intakes of the age-sex groups of students in the sample were generally less than the standard (see Table 2). Elementary school females' intake represented the lowest percent of standard (81%), while senior high school boys were the only group whose caloric intake was above the recommended amount (110%).

Table 2. Caloric Intake and Percentage of Calories from Protein, Fat, and Carbohydrate

Group	Median Energy Need* (kcal)	Mean Energy Intake of Group (kcal)	% of Standard	Percentage of Calories from Protein	Fat	Carbohydrate
Elem. Male	2400	2180	91%	16%	35%	49%
Elem. Female	2400	1942	81%	16%	36%	48%
Jr. Hi. Male	2700	2654	98%	16%	36%	48%
Jr. Hi. Female	2200	2057	93%	15%	36%	49%
Sr. Hi. Male	2800	3079	110%	16%	37%	48%
Sr. Hi. Female	2100	2028	97%	15%	35%	50%

*Note: The energy need figures taken from Recommended Dietary Allowances (1980), were based on median energy intakes of children followed in longitudinal growth studies.

All six age-sex groups had similar diets in terms of proportion of calories from protein (15%--16%), fat (35%--37%), and carbohydrate (48%--50%). The U.S. Dietary Goals (Senate Select Committee on Nutrition and Human Needs, 1977) recommended that protein account for about 12% of caloric intake, fat, 30%, and carbohydrate, 58%.

Table 3 provides a further breakdown of the fat intake. The mean cholesterol intake of senior high school males was close to the national per capita average of 500 mg, while the mean intake of all females was close to the 300 mg. recommendation found in the U.S. Dietary Goals (Senate Select Committee, 1977).

Table 3. Fat, Cholesterol, and Fatty Acid Intake

Group	Cholesterol (mg)	Fat (g)	Grams of and Percentage of Calories from Saturated Fatty acids (g)	(%)	Oleic acid (g)	(%)	Linoleic acid (g)	(%)
Elementary Males	388	90	35	14%	33	14%	9	4%
Elementary Females	325	82	33	15%	29	13%	9	4%
Jr. High Males	466	111	43	15%	41	14%	13	4%
Jr. High Females	310	85	32	14%	30	13%	11	5%
Sr. High Males	535	128	49	14%	47	14%	15	4%
Sr. High Females	297	81	28	12%	30	13%	12	5%

The Goals also recommended that the three types of fats (saturated, mono-unsaturated, and polyunsaturated) each provide 10% of an individual's total caloric intake.

An analysis of high-sugar foods ingested showed that the diets commonly included candy and soda (soft drinks). Males at the high school level drank on the average about one 12-ounce can of soda a day. The contribution of snacks to caloric intake is shown in Table 4.

Table 4. Caloric Intake of Meals and Snacks

Grade Level	Caloric Intake of Meals (kcal)			Caloric Intake of Snack (kcal)	Percentage Contribution of Snack Calories to Total Daily Intake of Calories from		
	Brkfst	Lunch	Dinner		Protein	Fat	Carbohydrate
Elementary	345	550	645	522	15%	23%	31%
Jr. High	390	530	685	766	21%	29%	40%
Sr. High	356	529	732	1028	29%	37%	42%

Whereas snacks corresponded in caloric content roughly to a meal for the elementary school students, for the senior high school students, snacks accounted for a substantially greater proportion of their caloric intake.

Those who ate breakfast had substantially higher nutrient intakes than those who did not eat breakfast. Of the 57 students who met the RDA for all nine nutrients, all but one ate breakfast.

Principal/Administrator Questionnaire

Although the 217 responding administrators themselves have generally not had training in nutrition, they felt that their teachers and food service managers are knowledgeable in providing nutrition education to students. Administrators expressed concern about students' poor food choices and nutrition-related health problems such as dental decay and obesity. These areas are ones which administrators felt nutrition education should address.

Most schools are providing some nutrition education; however, one-fourth of the administrators felt it was inadequate. Nutrition education is generally integrated into health classes. School as well as community resource people are used for nutrition instruction. Some schools include nutrition education in the school meal programs; however, in more than half of the schools there is no coordination between food service managers and the instructional staff.

Administrators said that parents need to be actively involved in the school's nutrition education program through parent organizations or assisting in field trips, classroom activities, and health screening. Although most adminstrators felt nutrition education in-service training is important to teachers and food service personnel, many indicated that such training has not been provided. One problem is the lack of funding. Other constraints included time, inconvenient meeting times, and recruitment. Administrators are also willing to attend in-service training.

Teacher Questionnaire

Among the 1107 teachers from all grade levels (including preschool) and from the secondary subject areas of health, physical education, science, home economics, agriculture, and social studies, about a third had received formal instruction in food science and nutrition. About half felt they were properly trained to teach nutrition concepts. The percentage who actually were conducting nutrition education is shown in Table 5.

Table 5. Teachers Conducting Nutrition Education

Grade	Yes	No	Had nutrition course in degree program
Preschool	80%	20%	40%
K-3	81%	19%	29%
4-6	62%	38%	23%
7-9	47%	53%	33%
10-12	51%	49%	39%
Subject			
Social Studies	19%	81%	13%
Health/Physical Education	51%	49%	48%
Science	43%	57%	18%
Home Economics	95%	5%	95%

Food service managers were usually not involved in planning classroom nutrition activities, although almost all teachers agreed they should be. Most teachers felt that parents and students would both be receptive to learning about nutrition in schools. The degree of parent involvement desired depended largely on the task. Teacher knowledge was weak on items about efficiency of food group systems, and sources of iron, vitamin A, and vitamin C.

Three-fourths of the most frequently used nutrition materials were more than 10 years old; however, the materials generally received high evaluations from the teachers. Other results from the teacher evaluation of materials appear in the next section.

Materials Review

Materials were also evaluated by the Project using an instrument developed by Go (1976) and according to the goals set by USDA as administrators of the NET Program. A summary of the reviews conducted by the Society for Nutrition Education (Cooper & Go, 1976) and the project revealed that materials have a wealth of information and ideas for teachers or others to use. The problems lie often in the organization of the guide, the lack of an evaluative component, and insufficient recognition of multicultural differences, the school lunch program, and parent involvement.

There are local materials which address ethnic foods and lifestyle. A proportionately small number of teachers are using these materials. Many more use food and nutrition materials developed on the mainland United States.

Except for textbooks which averaged a rating of "adequate," other materials (curriculum guides, audio-visuals, and government, industry, and association publications) generally were rated "good" or "excellent.". Most teachers felt that the materials were usable for Hawai'i.

It is apparent that teachers must pull together their own resources from a wide selection of choices to carry out a nutrition education program in their classroom. Consequently, students who progress from grade to grade may or may not be taught nutrition. What is taught has not been systematically organized into a comprehensive program.

Food Service Manager Questionnaire

A substantial proportion of the 188 food service managers who responded to the survey said that their pre-employment as well as in-service training had been inadequate. For many managers, in-service training has never been available at their school; however, three-fourths would be willing to attend in-service training at their school. A substantially smaller proportion was willing to volunteer for planning or coordination of an in-service training program or work on curriculum development. Only 11% of the food service workers had had training in nutrition education. Two-thirds of the managers said that they had never provided in-service training for their workers.

Just about a third of the managers said that their school's program adequately met the educational needs of the students. Coordination between instructional staff and managers was generally considered desirable but is virtually nonexistent. Union contracts were seen as a major constraint. Almost all managers felt that in-service training in nutrition education should be mandatory for anyone teaching in that area. Schools have virtually no funding for such in-service training. The major constraint given, however, was the limited amount of time available.

Food service managers most often cited as problems the preparation of meals within economic constraints and using federally donated commodities. In-service training which would address all areas of nutrition including nutrients and their function is desired by managers. Another primary concern cited was school lunch plate waste.

School Nurse Questionnaire

Twenty-five school nurses who service schools within the State returned questionnaires. They reported that students usually stay home from school because of upper respiratory illnesses, such as colds, fevers, and flu. Health records also showed that asthma and stomachaches were common reasons.

Nurses reported that food allergies were the most frequently occurring problem throughout the school years. Nutrition-related problems included being overweight or underweight, iron deficiency anemia, and diabetes mellitus. The only available information to nurses are health records completed by physicians; therefore, the number of occurrences is not an actual count but an indication of where problems may lie.

Most nurses took a food or nutritional science course as part of their degree program. Nurses generally attended after-employment nutrition training; however, more than half still did not feel or were not sure whether they were properly trained to teach nutrition. Doubts of their ability were reflected in the number actually involved in nutrition education activities. Of the ten who reported conducting activities, some were actively involved, while others

were involved only marginally. Time was the major limiting factor of nurses. Most school nurses were unaware of the availability of food and nutrition curriculum guides and instructional materials, a finding which was also reflected in the limited types of materials they were using to conduct activities.

Student Questionnaire

Questionnaires were filled out by 3262 students from public and private schools. Elementary school students participated in the school breakfast and lunch programs more frequently than secondary level students. Their positive attitude toward the school lunch program also decreased as the students got older. Fewer secondary than elementary level students liked the food served for lunch. The more frequently mentioned dishes disliked included baked beans, turkey-corn scallop, and baked fish. Students generally agreed, however, that the food service staff cares about the food they serve and plans healthy meals. Junior and senior high students also complained about the amount of food served, the dining room environment, and the lunch schedule. (See Table 6.)

Students generally agreed that eating the right foods is important for feeling healthy; however, they admitted that this was not practiced daily. Their family had the strongest influence on students' food choices. Students were more likely to eat the foods of their culture daily. The generally more recent immigrant groups, Filipinos, Koreans, and Samoans, were more likely to eat the foods of their culture daily, while students of Chinese and Japanese ancestry were the least likely to do so. The cultural influence decreased as the students got older. American food was the most popular category and was eaten daily by the largest percentage of students. Their liking of American foods was again evident in the analysis of their favorite foods prepared at home. Many students said steak, roast beef, chicken, and pork chops were well liked. Several ethnic dishes were also named but not as frequently as the foods mentioned previously.

The percentage of students learning about food and nutrition during the school year declined as the students got older. Sixty-five percent of the elementary, 47% of the junior high, and 22% of the senior high school students were studying nutrition. Nutrition was being taught primarily in health and home economics classes. Students listed food selection, food preparation, functions of nutrients, nutritional value of foods, and food additives as topics of interest.

Most of the students answered the five cognitive questions incorrectly. Very few students could correctly identify the food which was a poor source of iron. They were more aware of sources of vitamin C and knew that starch was a major nutrient in rice. The concept of a balanced meal in relation to nutrient requirements was not well understood.

Table 6. Student Participation In and Attitudes Toward the School Lunch Program

Question	Elementary	Jr. High	Sr. High
1. How often do you eat the school lunch?			
Always	56%	33%	21%
Usually	27%	35%	32%
Sometimes	11%	23%	34%
Never	2%	5%	12%
Lunch not served	4%	4%	1%
2. School lunch serves food to stay healthy.			
Always true	63%	29%	16%
Usually true	18%	36%	35%
Sometimes	13%	25%	37%
Never true	1%	5%	10%
Lunch not served	4%	4%	1%
3. Food service staff care about food served students.			
Very much	65%	30%	16%
Some	20%	38%	43%
A little	8%	21%	28%
Never	2%	7%	12%
Lunch not served	4%	4%	1%
4. School lunch programs serve food I like to eat.			
Always	14%	4%	2%
Usually	32%	26%	20%
Sometimes	47%	59%	66%
Never	2%	6%	11%
Lunch not served	4%	4%	0%
5. There is enough food on plate to satisfy me.			
Always	36%	20%	10%
Usually	24%	25%	24%
Sometimes	27%	34%	36%
Never	9%	16%	29%
Lunch not served	5%	4%	1%
6. Dining room is pleasant place to eat.			
Strongly agree	13%	5%	3%
Agree	46%	45%	47%
Disagree	27%	35%	36%
Strongly disagree	13%	14%	13%
Lunch not served	1%	1%	1%
7. There is enough time to eat and visit during lunch.			
Always	25%	19%	11%
Usually	44%	45%	41%
Sometimes	23%	24%	25%
Never	8%	11%	21%
Lunch not served	0%	1%	1%

Parent Questionnaire

Of the students who filled out questionnaires, about 75% of their parents also responded to a parallel survey. These parents reported that "dental cavities" was the major problem of their children, followed by "frequent colds" and "being overweight." In most families both parents or adults work. Parents do the marketing spending $50-$74 per week for food in 35% of the households, $75-$99 per week (26%), and over $100 per week in 24% of the families.

Parents indicated that their children frequently participated in the school lunch but not the school breakfast program. Most children eat breakfast prepared at home by their parents. Breakfast is, however, the meal parents most frequently have trouble getting their children to eat. The cost and nutritive value of food had the most influence on food selected and prepared for the family meals.

Parents, like their children, did not do very well on the cognitive items. Very few could correctly identify a poor source of iron; less than half could define a balanced meal. Most knew the function of protein. Most parents get their food and nutrition information from the media. Friends, family, children, and medical personnel were also common sources.

Almost all parents agreed that both the school and the home should teach children how to select foods that are important for good health. Parents did admit, however, that they did not always set a good example for their children.

Most parents indicated they were willing to help with their children's homework assignments and attend parent meetings but preferred not to be involved in food and nutrition activities in the classroom. Only a fourth of the parents would help in school programs ranging from preparation of instructional materials to attending teacher training in nutrition. In comparison, teachers wanted more parent involvement. About half of the teachers would like parents to help in classroom instruction on food and nutrition. (See Table 7.)

Table 7. Willingness to have Parent Involved in School Food and Nutrition Program

Type of Involvement in FNE Program	YES		ALREADY DOING	
	Parent*	Teacher+	Parent*	Teacher+
Help in health screening	30%	48%	4%	1%
Help plan curriculum	33%	36%	5%	1%
Help make teaching materials	24%	46%	2%	1%
Help teach about food and nutrition	24%	62%	3%	3%
Help plan menus of school meals	28%	35%	2%	1%
Help on field trips	29%	68%	1%	2%
Attend parent meetings	36%	56%	3%	1%
Attend teacher training	27%	53%	1%	0%
Help with homework	74%	78%	5%	3%

*From Parent Questionnaire.
+From Teacher Questionnaire.

Parents were generally in favor of nutrition education, citing it as something needed by children, parents themselves, and teachers. Parents also said the questionnaire made them think about the diet of their family. There were a few negative comments; however, the strong interest in nutrition expressed by the parents may be one reason why so many took the time to complete the questionnaire.

Community Agency Survey

About three-fourths of the 174 agencies sampled provide food and nutrition education services. There are programs for just about any age level from the very young to people over 65 years and for any health condition whether normal, handicapped, pregnant, or ill. Fewer than a third of these programs are staffed by nutritionists, dietitians, and home economists, but many rely on other professionals, such as nurses, social or public health workers, or health educators to carry out their services.

The most frequently offered services were nutrition education materials (46%) and meals (41%). Agencies developing materials made them available to other community programs. Some agencies, particularly those staffed by nutritionists, dietitians, or home economists, were called upon by other agencies for consultation and presentations through classes or lectures.

A small number of agencies are producing school instructional materials and conducting teacher and food service personnel training. These agencies would be of special interest to the DOE in coordinating the State's Nutrition Education and Training program.

Goals and objectives were general and aimed at keeping the public informed and fed. There was interest in promoting wellness and a need for making appropriate client referrals. Although most agencies were unwilling to disclose funding information, many would like more money to expand or develop their program. Many agencies cited their staff as major contributors to the success of their program.

Summary, Discussion, and Recommendations

The statewide assessment of the nutrition education and training needs of children, teachers, and food service personnel included surveys of administrators, teachers, food service managers, school nurses, students, parents, and community agencies, a materials review, a literature search, and a 24-hour student diet recall. Findings indicated a strong interest in nutrition by persons in the schools and community and the need for nutrition education and training.

The literature search and data collection revealed several nutrition-related health and dietary problems of children in Hawai'i. Diet data of many students indicated that the continuation of diets at their current low level of nutritiousness would increase the risk of certain health problems.

Not all students reported receiving nutrition education in school. Nutrition education was lacking especially at the senior high school level, the grade level at which students also had the poorest diets. Although students have a positive attitude about food and its relationship to good health, they generally do not understand basic nutrition principles, and they need to improve their diets.

Community or government agencies do offer food and nutrition services for youth. For most students, however, food and nutrition programs outside of classes are practically nonexistent.

Parents felt that it is important for both the school and home to teach children how to select foods that are important for good health. Although parents indicated that they did not always set a good example for their children by selecting wholesome foods, many expressed concern about serving nutritious food to their family. Parents themselves were interested in learning more about food and nutrition.

Preschool and lower elementary school teachers were the most involved in comparison to other grade level teachers in teaching food and nutrition concepts; however, many of these teachers did not take nutrition-related coursework as part of their degree program, nor did they attend postemployment training sessions. Teachers at all levels generally felt that students were interested, parents were not resistant, and cost was not a limiting factor in conducting nutrition education.

Administrators, teachers, and food service managers all agreed that coordination of classroom nutrition activities with the food service program is needed but is rarely carried out. Teachers said that there is no curriculum on how to tie in the food service program and that they are not informed or knowledgeable about the food service program. Administrators and food service managers saw union contracts as a problem. Coordination is possible, however, as shown in a recent pilot test program. Since full support from administrators would facilitate the establishment of a viable school program, and since administrators said they would attend nutrition education training, it is recommended that training be provided for administrators.

Although teachers generally rated the nutrition education materials they used as "good" or "excellent," three-fourths of the teachers were using materials at least 10 years old. Largely because there is a lack of a sequential nutrition curriculum for Hawai'i and materials which support the program, many administrators are not aware of how nutrition fits into a total school program, teachers do not know what nutrition concepts, if any, are being taught at other grade levels, food service managers are left out of the picture, and students hear the basic food groups again and again. It is recommended that

the schools incorporate a sequential food and nutrition curriculum which not only provides information but also affects students' decision making about the food they eat.

Food service personnel and the school food programs have played secondary roles and are recognized as a feeding rather than an educational program of schools. Administrators highly praised their managers but generally leave the operation of the food service facility to the managers themselves.

Managers indicated that their major problems in preparing meals were economic constraints and the use of federally donated commodities. Commodities keep costs down, but preparing and incorporating the items into dishes acceptable to students is a challenge. Plate waste was a big concern of the managers. Students of upper as compared to lower grade levels were less inclined to like the school lunch or think the school lunch was healthy or that it had been prepared with care. Secondary level students were also less satisfied about the dining room facilities, the amount of food served, and the time allowed to eat and meet with friends during lunch. The psychological and sociological factors associated with eating must be considered when trying to influence the nutritional intake of students. It is crucial that the gap between the realities of managing school food programs and the acceptance and respect for the school breakfast and lunch be bridged.

Training for teachers must provide more than nutrition information. In order to make nutrition education an effective reality in the schools, it is recommended that teachers be given direction and focus (that a sequential curriculum would assist in providing), teaching strategies, and support services as well as factual nutrition information.

It is recommended that managers be trained in a) establishing the food service program and area as a learning laboratory for nutrition education, b) working with other school staff for support of the breakfast and lunch programs as well as to provide support for the school's nutrition program, and c) developing skills for training their workers.

It is also recommended that training in nutrition be provided to school nurses as well as to health aides. Since nutrition is just one of many health areas of concern to nurses, training should focus on available nutrition resources and the role of the nurse as a school resource person, who could provide teachers with food and nutrition information, materials, or sources of materials. Health aides should be trained in nutrition because they are in daily contact with students with health problems, whereas school nurses are in charge of a school complex.

Training staff to carry out a school nutrition education program is critical. It is also clear that a nutrition education program, including the curriculum, must include much more than information transmission. It not only must address changes in eating habits, but it also must concern itself with the political, economic, and commercial aspects of food. It must teach that much of what is said about nutrition is neither true nor false, but indeterminate (Morowitz, 1980); furthermore, our knowledge base is rapidly changing. Students must learn how to be discriminating about dietary advice (Contento, 1980). Finally the overall goal of nutrition education must be emphasized: to produce nutritionally healthy people.

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