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INJURY AND ILLNESS INCIDENCE AND RISK FACTORS IN FEMALE ENLISTED BASIC TRAINEES AND FEMALE OFFICER BASIC TRAINEES

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13. ABSTRACT *(Maximum 200 words)*
This study determined the incidence of and risk factors for training injuries and illnesses for 44 U.S. Army female enlisted basic trainees and 54 female officer basic trainees. We followed each group prospectively through their respective 8 week training cycles. During enlisted basic training, 59.1% (26/44) of the women were injured at least once and for officer basic training, 24.1% (13/54) incurred one or more injuries. Overuse injuries were the most frequently reported injuries in the enlisted and officer groups (68.1% and 57.1% respectively). Twenty-six enlisted basic trainees suffered a total of 236 days of injury-associated lost duty time, while 13 officer basic trainees suffered 106 days of lost time. Descriptive analyses revealed that for illness, 59.1% (26/44) of enlisted basic trainees and 31.5% (17/54) of officer basic trainees had one or more illness visits to a medical treatment facility. Respiratory illnesses were common in enlisted and officer groups (40.0% and 22.0%, respectively). Illnesses resulted in a total of 101 duty days lost for 26 enlisted basic trainees and 19 duty days lost for 17 officer basic trainees. Major conclusions drawn from this study were that injuries were the major causes of morbidity in enlisted basic trainees and officer basic trainees in terms of lost duty days. Incidences of injury and illness were much higher in enlisted basic trainees than officer basic trainees. Excessive vitamin A intake and black race were associated with higher risk for injury in enlisted basic trainees. Daily niacin intake >15 mg, black race, and low serum ferritin were associated with higher illness risk in enlisted basic trainees. No significant risk factors were identified for injury and illness in the officer basic trainees.

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EXECUTIVE SUMMARY

This study determined the incidence of and risk factors for training injuries and illnesses for 44 U.S. Army female enlisted basic trainees and 54 female officer basic trainees. We followed each group prospectively through their respective 8 week training cycles. During enlisted basic training, 59.1% (26/44) of the women were injured at least once and for officer basic training, 24.1% (13/54) incurred one or more injuries. Overuse injuries were the most frequently reported injuries in the enlisted and officer groups (68.1% and 57.1%, respectively). Twenty-six enlisted basic trainees suffered a total of 236 days of injury-associated lost duty time, while 13 officer basic trainees suffered 106 days of lost time.

Logistic regression analyses revealed that for enlisted trainees, the independent and significant risk factors for overuse injuries were excessive self-reported intake of vitamin A (greater than Military Recommended Dietary Allowance [MRDA] requirements for soldiers aged 17-50 years, AR 40-25) ($p = 0.02$, Odds Ratio [OR] = 13.7, 95% Confidence Interval [CI] = 1.5 - 126.5) prior to basic training and black race ($p = 0.02$, OR = 35.3, 95% CI = 1.9 - 650.0).

Univariate analyses showed that enlisted trainees with 2 mile run times slower than 23 min were at lower risk for any type injury than faster soldiers ($p = 0.02$). Also, trainees with lower sit-up scores ($\leq$ 29 sit-ups) were at lower risk for overuse injuries than those with higher scores ($p=0.03$). Lower body mass was a significant risk factor for injury ($p=0.04$). No significant risk factors were identified for injuries in the officer basic trainees.

Descriptive analyses revealed that for illness, 59.1% (26/44) of enlisted basic trainees and 31.5% (17/54) of officer basic trainees had one or more illness visits to a medical treatment facility. Respiratory illnesses were common in enlisted and officer groups (40.0% and 22.0 %, respectively). Illnesses resulted in a total of 101 duty days lost for 26 enlisted basic trainees and 19 duty days lost for 17 officer basic trainees.

Logistic regression analyses showed that for enlisted basic trainees, the independent and significant predictor for any type of illness was self-reported daily intake of niacin >15 mg ($p = 0.02$, OR = 7.01, 95% CI = 1.3 - 38.3) prior to basic training.

The significant and independent risk factors for infectious illnesses in enlisted basic trainees were black race ($p = 0.02$, OR = 36.1, 95% CI = 1.8 - 730.2) and low serum ferritin (< 20 ng/ml) ($p = 0.03$, OR = 6.4, 95% CI = 1.2 - 34.6).

Univariate analyses revealed that significant risk factors for any type of illness in enlisted trainees included black race ($p = 0.04$), taller stature ($p = 0.04$), and lower body mass index (BMI) ($p = 0.02$). No significant risk factors for illnesses were found for officer basic trainees.

Major conclusions drawn from this study were that injuries were the major causes of morbidity in enlisted basic trainees and officer basic trainees in terms of lost duty days. Incidences of injury and illness were much higher in enlisted basic trainees than officer basic trainees. Excessive vitamin A intake and black race were associated with higher risk for injury in enlisted basic trainees. Daily niacin intake >15 mg, black race, and low serum ferritin were associated with higher illness risk in enlisted basic trainees. No significant risk factors were identified for injury and illness in the officer basic trainees.

INTRODUCTION

The Army puts great emphasis on physical fitness training, since it is considered an important component of combat readiness. However, the incidence of training-related injuries and illnesses is high in the Army and other military populations (Cowan et al., 1988; Jones et al., 1988; Jones et al., 1993; Reynolds et al., 1994; Tomlinson et al., 1987), which is costly in terms of lost training time and reduced "combat effectiveness" of soldiers. It is important to determine the level of fitness essential for combat readiness and concomitantly minimize injury and illness incidence. Investigating the incidence and types of training-related injuries and illnesses and identifying the causes and risk factors for these injuries and illnesses may assist in developing preventive strategies to reduce these medical problems.

Some recent military studies have identified several risk factors for training injuries. Jones et al. (1993) showed that older male recruits were at greater risk for lower extremity injuries, while others found similar results for stress fractures (Schmidt-Brudvig et al., 1983; Gardner et al., 1988). However, results are conflicting for recruits. Westphal et al. (1996) noted a higher incidence of time-loss injuries in very young recruits (17 and 18 years), while other studies showed no difference in injury rates for age (Kimsey, 1993; Bell, 1994).

Smoking history has also been shown to be an injury risk factor for both male and female recruits (Cowan et al., 1988; Snoddy and Henderson, 1994; Westphal et al., 1996). Westphal et al. (1996) also found that alcohol history was a risk factor among recruits.

Jones et al. (1992) showed that male recruits with the highest and the lowest body mass index (BMI) were at greater risk of injury. Low physical fitness has also been shown to be an injury risk factor in male (Jones et al., 1988; Jones et al., 1992) and female recruits (Jones et al., 1988; Jones et al., 1992; Westphal et al., 1996).

For illnesses, some studies have shown that low nutritional intake alone (Field et al., 1991; Holm and Palmblad,1976), or in combination with intense physical activity (Moore et al., 1992), results in suppressed immune responses. Other studies have reported that low iron status may alter immunity (Dada-Latunde and Young, 1992; Good et al., 1988;

Omara and Blakley, 1994). Jones et al. (1988) reported that low levels of fitness was a risk factor for acute respiratory infections in male and enlisted basic trainees.

The major objective of this study was to determine the incidence of injuries and illnesses among enlisted trainees and officer trainees. The secondary objective was to investigate the relationship between demographic, anthropometric, fitness, hematological, and nutritional factors and injury and illness risk among these Army trainee populations.

METHODS

DESCRIPTION OF ENLISTED BASIC TRAINING AND OFFICER BASIC TRAINING

Army enlisted basic training is an 8-week course designed to teach "soldiering skills." Upon arrival, women must be able to perform 1 push-up to enter basic training. During training, all soldiers followed the same schedule consisting of physical training (e.g., running, calisthenics), road marching, other soldiering skills, and class work. A normal training day would begin with calisthenics and stretching, followed by a run. Throughout the 8-week period, running distance progressively increased from ½ mile per day to as much as 5 miles on occasion. Soldiers would march at least 1 or 2 miles to and from classrooms and training sites. Also, soldiers would be required to complete two longer road marches (6 to 10 miles) with a full combat load. Other soldiering activities included drill and ceremony, and combat activities such as obstacle courses, confidence courses, hand to hand combat, and rifle-bayonet training.

All officer students attended the core training program for 8 weeks. A majority of time was spent in classroom training during a full 8-hour duty day. Evenings and weekends were free for studying, recreation, or personal business. One major field exercise was scheduled during week 6 of training. During this week, students participated in field training for 3 days and nights on site at Camp Bullis, TX.

Physical training during the course was conducted 3 days per week, with all students participating in calisthenics and a 2-mile group run. Individual physical training was also encouraged, and fitness facilities were available for use by the students throughout their training program.

SUBJECTS AND STUDY DESIGN

Subjects were two different populations of soldiers. One population, enlisted basic trainees at Fort Leonard Wood, MO, had completed their initial entry processing and were prepared to join basic training units. These soldiers arrived in August from various locations around the United States. All available soldiers were briefed about the study (N=87), and fifty-three volunteered to participate. They trained in different companies during the study.

The second group of subjects was composed of medical department officer basic trainees who had arrived in June for training at Fort Sam Houston, TX. All available students (N=75) in that class were briefed about the study and 57 agreed to participate. They trained in a single company during the study.

Prior to the onset of training, we collected demographic, nutritional, body stature, iron status, physical fitness, and injury and illness data. At the end of the 8 weeks of training, follow-up medical data were obtained. Initial and follow-up medical data were available for 44 of the 53 enlisted basic trainees and 54 of the 57 officer basic trainees.

DEMOGRAPHIC DATA

All subjects completed a health performance and nutritional status questionnaire (Appendix) about background, health habits, and medical history. Age, race, education and smoking and alcohol history were included. Some individuals chose not to answer particular questions. Participants were asked if they had smoked cigarettes in the past year, number of cigarettes per day, and length of time. For alcohol history, we inquired about number of drinks consumed per week and length of time.

NUTRITIONAL DATA

The health performance and nutritional status questionnaire (Appendix) also included questions about eating patterns and food preferences prior to active duty. Questions were a modified version of the Health Habits and Diet History Questionnaire (Block et al., 1986). The brief, 60-item version evaluates 18 major nutrients and includes foods representing approximately 93% of total United States caloric consumption. This

reduced version produces estimates for a wider range of nutrients with validity and reproducibility similar to that of the full-length questionnaire used in numerous previous food consumption surveys (Block et al., 1990). Nutrient estimates for dietary assessment are provided on computer software and are based on the NHANES II nutrient content database (Smucker et al., 1989). Foods are grouped into six categories by food types: fruits and vegetables; entrees; breads, salty snacks, spreads; breakfast foods; sweets; and dairy foods and beverages. Other sections included inquiries about use of vitamin and mineral supplements, and consumption of beverages containing tannates and phosphates.

BODY STATURE DATA

Height was measured to the nearest cm using a stadiometer, and weight was measured to the nearest 0.1 kg using a SECA platform scale. Body mass index (wt/ht^2) was calculated.

PHYSICAL FITNESS DATA

Baseline physical fitness was assessed from the soldiers' initial Army Physical Fitness Test (APFT) conducted during the first week of training. Scores were obtained from unit training records. Test results included maximal effort 2-mile run times and maximal effort numbers of push-ups and sit-ups completed in separate 2-minute time periods.

IRON STATUS DATA

Blood samples were collected prior to training for the assessment of each soldier's iron status. Serum hemoglobin was measured using a Coulter Counter. Iron was measured in serum using ferro-zinc iron reagent after release from transferrin with acetic acid and reduction with hydroxylamine and thioglycolate. Ferritin was measured by

enzyme immunoassay nephelometry using Beckman specific protein analyzers. Transferrin saturation was measured after saturation with ferric chloride and removal of excess iron with an alumina column.

For classification purposes, a serum ferritin of (> 12 ng/ml but < 20 ng/ml) represented minimal iron stores. *Nonanemic iron depletion* was defined as complete depletion of iron stores in the bone marrow characterized by a serum ferritin level < 12 ng/ml with normal serum hemoglobin >12 g/dl, iron >40 µg/dl and transferrin saturation levels >20%. *Iron-deficient erythropoiesis* was characterized by serum ferritin levels < 12 ng/ml, serum iron levels < 40 ug/dl and transferrin saturation levels < 20%. *Iron-deficiency anemia* was defined as serum hemoglobin levels < 12 g/dl, serum ferritin levels < 12 ng/ml, iron levels < 40 µg/dl, and transferrin saturation levels < 20% (Harris, 1995).

INJURY AND ILLNESS DATA

Injuries and illnesses were documented by the same physician and a trained technician via medical record reviews on two different occasions. The initial review was conducted during the first week of training, while the second one was performed during the last week of the training cycle. At the completion of the review, medical records had been located and recorded for 44 out of 53 (83.0%) enlisted basic trainees and 54 out of 57 (94.7 %) officer basic trainees. For each visit, information extracted from medical records included the date of each clinic visit, the verbatim diagnosis, body system involved, anatomic location of each injury, and the disposition and days of restricted duty resulting from the injury or illness.

For classification purposes, *injury* or *illness* cases were defined as any medical complaint reported during basic training, officer or enlisted, which resulted in at least one clinic visit. Overuse injuries were defined as injuries caused by repetitive micro trauma (e.g., strains, tendinitis, stress fractures) associated with such activities as running and marching. Traumatic injuries were specified as injuries associated with an obvious single event (e.g., stepping in a pothole and twisting an ankle). An injury associated with lost duty time was defined as a complaint that resulted in a period of medically restricted activity

prescribed by medical personnel and lasting at least 24 hours.

STATISTICAL ANALYSIS

The descriptive analyses were performed on 44 enlisted trainees and 54 officer trainees because their medical records were available. All injury and illness data were double entered and cross-checked (using Epi Info version 6.0 validation program) for error control and then up-loaded for analysis. Univariate analyses were conducted using Epi Info version 6.0 and SPSS version 6.1 statistical packages.

The total number of initial visits, follow-up visits, and lost duty days were tallied for injuries and illnesses . The cumulative incidence (percentage) of individuals experiencing injuries or illnesses was calculated by dividing the number of soldiers with one or more injuries or illnesses by the total number of soldiers with available medical records.

Risk ratios for injury and illness were calculated by dividing the percentage of individuals with one or more injuries or illnesses in a risk group by the percentage in a reference group (one exhibiting the lowest risk of injury). Baseline demographic data (age, height, body mass, body mass index) and fitness data (sit-ups, push-ups, 2 mile run time) were grouped into three equal-sized groups (tertiles) representing low to high, slow to fast. Iron status parameters (ferritin, iron, transferrin sat [%], hemoglobin) were dichotomized at clinically significant cut points that precluded the use of tertiles. Race groups were classified as white, black and other. Hispanic, Asian, and races not specifically identified were combined to form the other race group because of small sample sizes.

Partitioned chi-square techniques were used to compare risk groups and test for significance of differences in injury and illness incidence. A Fisher exact test was performed if the cell size was less than 5. Confidence intervals of 95% were calculated for all risk ratios, and ratios significant at the 0.05 level were noted.

Purposeful logistic regression (using the SAS version 6.11 statistical software package) was used to examine interrelationships among potential risk factors and injuries and illnesses. Models were developed for any injury, overuse injury, any illness, and

infectious illness. Models were required to have a goodness-of-fit > 0.05 (Hosmer and Lemeshow, 1997).

Logistic regression requires that all variables (dependent and independent) have complete data for any subject to be included in the analysis. Variables entered into the models were those that were significant at < 0.20 (Hosmer and Lemeshow, 1997) during the univariate logistic regression analysis, or those found to be significant in other studies (Cowan et al., 1988; Jones et al., 1988; Jones et al., 1992; Reynolds et al., 1994; Westphal et al., 1996). Variables entered into the initial models included age, race, BMI, push-ups, sit-ups, run time, serum ferritin < 20 ng/ml, potassium intake, vitamin A intake, vitamin C intake, niacin intake, and alcohol and tobacco use.

RESULTS

PRE-TRAINING DESCRIPTIVE DATA

Table 1 shows all available descriptive and APFT data of the 44 enlisted basic trainees prior to training. These soldiers were slightly heavier and less physically fit relative to soldiers in previous studies prior to basic training (Jones et al., 1988), but similar to trainees in a more recent study (Westphal et al., 1996). Twenty-seven of the 44 (61.4%) soldiers were white, 10 (22.7 %) were black, and 7 (15.9%) were of other races (e.g., Hispanic, Asian, other). Among 43 soldiers, all graduated from high school, 19 completed at least 1 year of college, and 2 completed at least 1 year of post-graduate training. Alcohol use was reported by 15 out of 43 soldiers (34.9%). Among 44 soldiers, 15 (34.9%) reported smoking and 1 (2.3%) reported using chewing tobacco products prior to training.

Table 2 shows all available descriptive and APFT data of the 54 officer basic trainees prior to training. These soldiers were older, leaner and more physically fit than the enlisted basic trainees in this and previous studies (Jones et al., 1988; Westphal et al., 1996). Forty-two of the 54 (77.7%) were white, 5 (9.26%) were black, and 7 (13.0%) were of other races. All 54 soldiers reported completing at least 1 year of college and 9 completed at least 1 year of post-graduate training. Among the 54 soldiers, alcohol use was reported by 30 soldiers (63.8%). Three of the 54 soldiers (5.6%) reported smoking and 1 soldier (1.9%) reported using chewing tobacco products prior to training.

Table 3 represents the mean daily self-reported nutrient intakes of enlisted basic

trainees (n=44) prior to training, as compared to the MRDA for soldiers aged 17-50 years (Department of the Army, Navy and the Air Force, Headquarters, 1985). Their mean caloric intake was only 72.3% of the MRDA nutrient intake and did not meet the MRDA requirements for iron, folic acid, zinc, and vitamin B_6.

Table 4 shows the mean daily self-reported nutrient intakes and MRDA of the officer basic trainees (n=54) prior to training. Their mean daily caloric and saturated fat intake were slightly lower than the enlisted basic trainees. The mean daily nutrient intake of the officer trainees did not meet the MRDA requirements for iron, folate, zinc, and vitamin B_6. However, daily intake of these nutrients was slightly higher relative to the enlisted basic trainees. Also, 17.3% reported vitamin A intake and 7.7% reported niacin intake greater than 2 times the MRDA.

Table 1. Age, physical characteristics and fitness of enlisted basic trainees before training.

CHARACTERISTIC	n	MEAN	SD (±)	MINIMUM	MAXIMUM
Age (years)	44	20.3	4.0	18.0	35.0
Height (cm)	44	162.8	7.8	141.8	179.0
Body Mass (kg)	44	63.1	11.1	47.2	97.4
Body Mass Index (kg/m^2)	44	23.7	3.2	17.7	30.4
Push-ups (n)	30*	11.1	11.1	0.0	46.0
Sit-ups (n)	30*	34.6	16.9	4.0	80.0
2-Mile Run (min)	30*	21.8	2.6	14.9	26.5

* Fitness records not available for 14 soldiers due to nonmedical reasons.

Table 2. Age, physical characteristics and fitness of officer basic trainees before training.

CHARACTERISTIC	n	MEAN	SD (±)	MINIMUM	MAXIMUM
Age (years)	51*	26.0	4.4	21.0	38.0
Height (cm)	53*	163.5	6.5	153.2	179.8
Body Mass (kg)	54	60.4	8.6	47.0	86.9
Body Mass Index (kg/m^2)	53*	22.6	2.2	18.5	28.4
Push-ups (n)	54	39.1	17.7	6.0	82.0
Sit-ups (n)	54	66.4	21.2	19.0	102.0
2-Mile Run (min)	54	18.0	2.6	13.1	25.4

* Data missing from records.

Table 3. Mean daily nutrient intakes and MRDA* of enlisted basic trainees before basic training.

NUTRIENTS	MRDA	MEAN DAILY NUTRIENT INTAKE	% MRDA
Energy (kcal)	2400	1734.0	72.3
Protein (g)	80	73.4	91.8
Fat (g)◆	-	62.4	-
Carbohydrate (g)◆	-	226.0	-
Vitamin C (mg)	60	185.0	308.3
Calcium (mg)	800-1200	940.0	>100.0
Phosphorus (mg)	800-1200	1255.0	>100.0
Iron (mg)	15	11.7	78.0
Sodium (mg)♠	-	2861.0	-
Potassium (mg)✶	-	2678.0	-
Vitamin A (RE)	800	1218.0	152.3
Thiamine (mg)	1.2	1.5	125.0
Riboflavin (mg)	1.4	2.0	143.0
Niacin (mg)	16	18.4	115.0
Folate (mg)✹	400	329.0	82.3
Vitamin E (mg)	8	11.0	137.5
Zinc (mg)	77.3	11.6	15.0
Vitamin B_6 (mg)	90.0	1.8	2.0
Magnesium (mg)	132.2	0.9	0.7
Saturated Fat (g)◆	-	21.9	-

* Military recommended dietary allowance for female soldiers aged 17-50 years (Department of the Army, Navy and the Air Force, Headquarters).

◆ No established U.S. Recommended Daily Allowance or MRDA denoted by " - ".

♠ Target for sodium is 1700 mg per 1000 kcal (i.e., 4080 for female soldiers).

★Estimated safe and adequate intake is 1875-5625 mg of potassium.

✹ As recommended by the Centers for Disease Control, 1992.

Table 4. Mean daily nutrient intakes and MRDA* of officer basic trainees before basic training.

NUTRIENTS	MRDA	MEAN DAILY NUTRIENT INTAKE	% MRDA
Energy (kcal)	2400	1619.9	67.5
Protein (g)	80	72.8	91.0
Fat (g)◆	-	53.7	-
Carbohydrate(g)◆	-	211.7	-
Vitamin C (mg)	60	163.4	272.3
Calcium (mg)	800 -1200	964.0	<100.0
Phosphorus (mg)	800 - 1200	1291.8	> 100.0
Iron (mg)	15	12.6	84.0
Sodium (mg)♠	-	2900.8	-
Potassium (mg)★	-	2704.5	-
Vitamin A (RE)	800	1204.7	-
Thiamine (mg)	1.2	1.6	133.3
Riboflavin (mg)	1.4	2.2	157.1
Niacin (mg)	16	20.0	125.0
Folate (mg)✹	400	358.7	89.7
Vitamin E (mg)	8	10.5	131.3
Zinc (mg)	15	12.6	84.0
Vitamin B_6 (mg)	2.0	1.9	95.0
Magnesium (mg)	300	565.5	188.8
Saturated Fat (g)◆	-	17.9	-

* Military recommended dietary allowance for female soldiers aged 17-50 years (Department of the Army, Navy and the Air Force, Headquarters, 1985).

◆ No established U.S. Recommended Daily Allowance or MRDA denoted by " - ".

♠ Target for sodium is 1700 mg per 1000 kcal (i.e., 4080 for female soldiers).

★Estimated safe and adequate intake is 1875-5625 mg of potassium.

✹ As recommended by the Centers for Disease Control, 1992.

Table 5 shows the iron status data of the enlisted basic trainees before training relative to normal ranges for adult females. Four out of 44 trainees chose not get their blood drawn. The group means for serum hemoglobin, ferritin, iron, and transferrin saturation were within the normal ranges for healthy adult females. The group mean values were also slightly higher than other enlisted basic trainee populations (Westphal et al., 1996). However, among 40 enlisted basic trainees, 6 (5.0%) could be classified as *nonanemic iron depleted*. One trainee (2.3%) had values consistent with *iron-deficient erythropoiesis*, and 3 (7.5%) were diagnosed as having *iron-deficiency anemia* (Harris, 1995).

Table 6 shows the iron status of the officer basic trainees prior to training compared to normal ranges for healthy adult females. Serum hemoglobin values were not reported for 5 out of the 54 trainees. The group means for serum hemoglobin, ferritin, iron, and transferrin saturation were within the normal ranges for adult females (Harris, 1995) and slightly higher relative to the enlisted basic trainees in this study. Among 54 officer trainees, 5 (9.2%) had values consistent with *nonanemic iron depletion*. One out of 49 soldiers had values consistent with *iron-deficiency anemia*, but this did not result in a clinic visit.

Table 5. Comparison between iron status of enlisted basic trainees prior to basic training and normal ranges* for adult females.

BLOOD PARAMETER	n	MEAN	SD (±)	MINIMUM	MAXIMUM	NORMAL RANGE (FEMALES)*
Serum Hemoglobin (g/dl)**	40	13.3	0.9	10.9	15.2	12 - 16
Serum Ferritin (ng/ml)**	40	33.1	24.4	4.7	120.9	12 - 150
Serum Iron (µg/dl)**	40	84.3	39.3	10.0	165.0	40 - 150
Transferrin Saturation (%)**	40	22.4	10.1	2.4	42.5	20 - 55

* Harris, 1995.

** Four soldiers chose not to have blood drawn.

Table 6. Comparison between iron status of officer basic trainees prior to training and normal ranges* for adult females.

BLOOD PARAMETER	n	MEAN	SD (±)	MINIMUM	MAXIMUM	NORMAL RANGE (FEMALES)*
Serum Hemoglobin (g/dl)**	49	13.5	0.8	11.7	15.0	12 - 16
Serum Ferritin (ng/ml)	54	41.1	35.2	4.3	225.5	12 - 150
Serum Iron (µg/dl)	54	107.8	48.2	38.0	293.0	40 - 150
Transferrin Saturation (%)	54	28.2	13.2	8.8	84.9	20 - 55

* Harris, 1995.

** Data missing from records.

INJURY AND ILLNESS DATA

Incidence and Distribution of Injury

Enlisted Basic Training. During the 8-week period of basic training, 59.1% (26/44) of soldiers incurred one or more injuries. Eighty-one percent (21/26) of these injures resulted in days lost from duty. The crude incidence rate (initial clinic visits) was 29.5 injuries per 100 soldiers per month. Table 7 shows the frequency of injuries and clinic visits, and the days lost from duty due to the injury. Overuse injuries were the most frequently reported injuries (68.1%) and accounted for the greatest number of clinic visits (57 initial and follow-up clinic visits) and lost duty days (165 days) when compared to traumatic, wound and other injuries. There was only one stress reaction injury reported which resulted in 27 days of lost duty days. The three most common injuries reported were overuse strains, generalized musculoskeletal overuse pain, and other overuse injuries not otherwise specified. They accounted for 55.3% of all injuries. The most common traumatic injuries were soft tissue contusions. One fracture was reported which resulted in 29 days of lost duty time.

The anatomical sites of injury are presented in Table 8. Most of the injuries involved either the lower extremities (74.5%) or spine and trunk (14.9%). The foot, knee, and shin (pretibial) were the injury sites resulting in the highest number of days lost from duty. The average number of days lost per injury was highest in injuries affecting the feet, shin (tibia of leg), and hip areas, suggesting that these were the sites most severely injured. The stress reaction case involved the shin.

Table 7. Frequency and distribution of injuries by type and loss of duty days in enlisted basic trainees.

Type of injury	Injury [a]		Total Clinic Visits [b]			Duty Days Lost		
	#	%	#	%	Mean [c]	#	%	Mean [d]
Overuse	**32**	**68.1**	**57**	**70.4**	**1.8**	**165**	**69.9**	**5.2**
Overuse Strain	11	23.4	17	21.0	1.5	69	29.2	6.3
Other Overuse	7	14.9	14	17.3	2.0	27	11.4	3.9
Pain	8	17.0	11	13.6	1.4	9	3.8	1.1
Tendinitis	3	6.4	9	11.1	3.0	30	12.7	10.0
Stress Reaction	1	2.1	4	4.9	4.0	27	11.4	27.0
Fasciitis	1	2.1	1	1.2	1.0	3	1.3	3.0
Ingrown Toenail	1	2.1	1	1.2	1.0	0	0.0	0.0
Traumatic	**7**	**14.9**	**11**	**13.6**	**1.6**	**41**	**19.9**	**5.2**
Contusion	3	6.4	3	3.7	1.0	3	1.3	1.0
Concussion	1	2.1	1	1.2	1.0	3	1.3	3.0
Strain	1	2.1	1	1.2	1.0	3	1.3	3.0
Sprain	1	2.1	2	2.5	2.0	3	1.3	3.0
Fracture	1	2.1	4	4.9	4.0	29	12.3	29.0
Wound	**4**	**8.5**	**7**	**8.6**	**1.8**	**24**	**10.2**	**6.0**
Blister	3	6.4	5	6.2	1.7	17	7.2	5.7
Abrasion/Laceration	1	2.1	2	2.5	2.0	7	3.0	7.0
Other Injury	**4**	**8.5**	**6**	**7.4**	**3.0**	**6**	**2.5**	**3.0**
Dehydration	2	4.3	3	3.7	1.5	6	2.5	3.0
Not otherwise specified	2	4.3	3	3.7	1.5	0.0	0.0	0.0
TOTAL	**47**	**100.0**	**81**	**100.0**	**1.7**	**236**	**100.0**	**5.0**

[a] Soldiers may have more than one injury.

[c] Mean = # of clinic visits per injury.

[b] Total Clinic Visits = initial and follow-up visits.

[d] Mean = # of duty days lost per injury.

Table 8. Frequency and distribution of injuries by location and loss of duty days in enlisted basic trainees.

Location of Injury	Injury [a]		Total Clinic Visits [b]			Duty Days Lost		
	#	%	#	%	Mean [c]	#	%	Mean [d]
Lower Extremity	**35**	**74.5**	**65**	**76.5**	**1.9**	**200**	**81.3**	**5.7**
Foot/Heel	13	27.7	23	28.4	1.8	74	31.4	5.7
Knee	9	19.1	21	24.7	2.3	39	15.9	4.3
Ankle	5	10.6	8	9.4	1.6	14	5.7	2.8
Hip	3	6.4	5	5.9	1.7	32	13.0	10.7
Shin	3	6.4	6	7.1	2.0	38	15.4	12.7
Calf	1	2.1	1	1.2	1.0	0	0.0	0.0
Multiple Lower Body	1	2.1	1	1.2	1.0	3	1.2	3.0
Spine/Trunk	**7**	**14.9**	**9**	**10.6**	**1.3**	**20**	**8.1**	**2.9**
Lower Back	4	8.5	6	7.1	1.5	12	4.9	3.0
Chest	2	4.3	2	2.4	1.0	3	1.2	1.5
Neck	1	2.1	1	1.2	1.0	5	2.0	5.0
Upper Extremity	**2**	**4.3**	**3**	**3.5**	**1.5**	**7**	**2.8**	**3.5**
Shoulder	1	2.1	1	1.2	1.0	0	0.0	0.0
Finger	1	2.1	2	2.4	2.0	7	2.8	7.0
Other	**3**	**6.4**	**4**	**4.7**	**1.3**	**9**	**3.7**	**3.0**
Head	1	2.1	1	1.2	1.0	3	1.2	3.0
Other Part	2	4.3	3	3.5	1.5	6	2.4	3.0
TOTAL	**47**	**100.0**	**81**	**100.0**	**1.8**	**236**	**100.0**	**5.2**

[a] Soldiers may have more than one injury.
[b] Total Clinic Visits = initial and follow-up visits.
[c] Mean = # of clinic visits per injury.
[d] Mean = # of duty days lost per injury.

Officer Basic Training. During the 8-week period of officer basic training, 24.1% (13/54) of soldiers incurred one or more injuries. Ninety-two percent (12/13) of these injuries resulted in days lost from duty. The crude incidence rate (initial clinic visits) was 13 per 100 soldiers per month. Table 9 shows the frequency and distribution of clinic visits, and the days lost from duty due to the injury. Overuse injuries were the most frequently reported injuries (57.1%) and accounted for the greatest number of clinic visits (14 initial and follow-up visits) and lost duty days (77.0 days). The three most common injuries reported were overuse muscle strains, foot blisters, and overuse tendinitis, which accounted for 64.4% of all injuries and 69.8% of lost duty days.

Table 9. Frequency and distribution of injuries by type and loss of duty days in officer basic trainees.

Type of Injury	Injury [a]		Total Clinic Visits [b]			Duty Days Lost		
	#	%	#	%	Mean [c]	#	%	Mean [d]
Overuse	**8**	**57.1**	**14**	**63.6**	**1.8**	**77**	**72.6**	**9.6**
Overuse Strain	4	28.6	6	27.3	1.5	31	29.2	7.8
Other Overuse	1	7.1	1	4.5	1.0	1	0.9	1.0
Tendinitis	2	14.3	4	18.2	2.0	24	22.6	12.0
Bursitis	1	7.1	3	13.6	3.0	21	19.8	21.0
Traumatic	**1**	**7.1**	**1**	**4.5**	**1.0**	**10**	**9.4**	**10.0**
Contusion	1	7.1	1	4.5	1.0	10	9.4	10.0
Wound	**3**	**21.4**	**5**	**22.7**	**1.7**	**19**	**17.9**	**6.3**
Blisters	3	21.4	5	22.7	1.7	19	17.9	6.3
Other	**2**	**14.3**	**2**	**9.1**	**1.0**	**0**	**0.0**	**0.0**
Heat Exhaustion	1	7.1	1	4.5	1.0	0	0.0	0.0
Dehydration	1	7.1	1	4.5	1.0	0	0.0	0.0
Total	**14**	**100.0**	**22**	**100.0**	**1.6**	**106**	**100.0**	**7.6**

[a] Soldiers may have more than one injury.
[b] Total Clinic Visits = initial and follow-up visits.
[c] Mean = # of clinic visits per injury.
[d] Mean = # of duty days lost per injury.

The anatomical sites of injury are shown in Table 10. Most of the injuries involved either the lower extremities (42.9%) or spine/abdomen (21.4 %). The shoulder, hip, and foot were injury sites resulting in the highest number of days lost from duty. The average number of days of lost duty time per injury was highest in injuries affecting the hip, shoulder, calf and head.

Table 10. Frequency and distribution of injuries by location and loss of duty days in officer basic trainees.

Location of Injury	Injury [a]		Total Clinic Visits [b]			Duty Days Lost		
	#	%	#	%	MEAN [c]	#	%	MEAN [d]
Lower Extremity	**6**	**42.9**	**10**	**45.5**	**1.7**	**51**	**48.1**	**8.5**
Foot /Heel	3	21.4	5	22.7	1.7	19	17.9	6.3
Knee	1	7.1	1	4.5	1.0	1	0.9	1.0
Hip	1	7.1	3	13.6	3.0	21	19.8	21.0
Calf	1	7.1	1	4.5	1.0	10	9.4	10.0
Spine/Abdomen	**3**	**21.4**	**5**	**22.7**	**1.7**	**21**	**19.8**	**7.0**
Abdomen	1	7.1	2	9.1	2.0	4	3.8	4.0
Neck	2	14.3	3	13.6	1.5	17	16.0	8.5
Upper Extremity	**2**	**14.3**	**4**	**18.2**	**2.0**	**24**	**22.6**	**12.0**
Shoulder	2	14.3	4	18.2	2.0	24	22.6	12.0
Other	**3**	**21.4**	**2**	**9.1**	**1.0**	**0**	**0.0**	**0.0**
Head	1	7.1	1	4.5	1.0	10	9.4	10.0
Not otherwise specified	2	14.3	1	4.6	0.5			
Total	**14**	**100.0**	**22**	**100.0**	**1.6**	**106**	**100.0**	**7.6**

[a] Soldiers may have more than one injury.
[b] Total Clinic Visits = initial and follow -up visits.
[c] Mean = # of clinic visits per injury.
[d] Mean = # of duty days lost per injury.

Incidence and Distribution of Illness

Enlisted Basic Training. The cumulative incidence of soldiers with one or more illness was 59.1% (26/44). Fifty percent (13/26) of these illnesses resulted in days lost from duty. The crude incidence rate (initial clinic visits) was 29.5 illnesses per 100 soldiers per month. The frequency and distribution of different types of illnesses are shown in Table 11. Respiratory, dermal, and gastrointestinal complaints were the three most frequent illness categories reported. Respiratory complaints (15 cases were upper respiratory infections) accounted for the greatest number of clinic visits (36 initial and follow-up visits) and number of lost duty days (42 days). Three soldiers were diagnosed with anemia, which resulted in a total of 2 days of lost duty time. One soldier was diagnosed with an adjustment disorder, which resulted in a hospitalization of 36 days and an early release from the Army.

Table 11. Frequency and distribution of illnesses and associated loss of duty days in enlisted basic trainees.

Type of Illness	Illness [a]		Total Clinic Visits [b]			Duty Days Lost		
	#	%	#	%	Mean [c]	#	%	Mean [d]
Respiratory	**22**	**40.0**	**36**	**44.4**	**1.6**	**42**	**41.6**	**1.9**
Upper Respiratory Infection	15	27.3	23	28.4	1.5	13	12.9	0.9
Bronchitis	2	3.6	5	6.2	2.5	8	7.9	4.0
Pneumonia	2	3.6	5	6.2	2.5	21	20.8	10.5
Allergic Rhinitis	2	3.6	2	2.5	2.0	0	0.0	0.0
Sinusitis	1	1.8	1	1.2	1.0	0	0.0	0.0
Dermis	**12**	**21.8**	**14**	**17.3**	**1.2**	**4**	**4.0**	**0.3**
Contact Dermatitis	5	9.1	6	7.4	1.0	4	4.0	1.7
Heat Rash	3	5.5	4	4.9	1.3	0	0.0	0.0
Insect Bites	2	3.6	2	2.5	1.0	0	0.0	0.0
Acne Pustule	1	1.8	1	1.2	1.0	0	0.0	0.0
Foot Fungal Infection	1	1.8	1	1.2	1.0	0	0.0	0.0
Gastrointestinal	**8**	**14.5**	**11**	**13.6**	**1.4**	**12**	**11.9**	**1.5**
Gastroenteritis	6	10.9	7	8.6	1.2	6	5.9	1.0
Gastritis	1	1.8	3	3.7	3.0	6	5.9	6.0
Hemorrhoids	1	1.8	1	1.2	1.0	0	0.0	0.0
Gynecological	**6**	**10.9**	**9**	**11.1**	**1.5**	**3**	**3.0**	**0.5**
Vaginitis	4	7.3	4	4.9	1.0	0	0.0	0.0
Fibroid Uterus	1	1.8	4	4.9	4.0	1	1.0	1.0
Menstrual Problem	1	1.8	1	1.2	1.0	2	2.0	2.0
Urinary	**1**	**1.8**	**1**	**1.2**	**1.0**	**0**	**0.0**	**0.0**
Urinary Tract Infection	1	1.8	1	1.2	1.0	0	0.0	0.0
Blood	**3**	**5.5**	**7**	**8.6**	**2.3**	**2**	**2.0**	**0.7**
Anemia	3	5.5	7	8.6	2.3	2	2.0	0.7
Cardiac	**1**	**1.8**	**2**	**2.5**	**2.0**	**5**	**5.0**	**5.0**
Arrhythmia	1	1.8	2	2.5	2.0	5	5.0	5.0
Psychosocial	**1**	**1.8**	**1**	**1.2**	**1.0**	**36**	**35.6**	**36.0**
Adjustment Disorder	1	1.8	1	1.2	1.0	36	35.6	36.0
Dental	**1**	**1.8**	**1**	**1.2**	**1.0**	**0**	**0.0**	**0.0**
Infection	1	1.8	1	1.2	1.0	0	0.0	0.0
TOTAL	**55**	**100.0**	**81**	**100.0**	**2.1**	**101**	**100.0**	**1.8**

[a] Soldiers may have more than one illness.

[b] Total Clinic Visits = initial and follow-up visits.

[c] Mean = # of clinic visits per illness.

[d] Mean = # of duty days lost per illness.

Officer Basic Training. The incidence of soldiers with one or more illness was 31.5% (17/54). Twenty-nine percent (5/17) of these illnesses were associated with time lost from duty. The crude incidence rate (initial clinic visits) was 15.7 illnesses per 100 soldiers per month. Table 12 shows the different types of illnesses. Dermal, respiratory, and urinary complaints were the most frequent illness categories reported. Dermal complaints accounted for the greatest number of total clinic visits. Dental, gynecological, and urinary complaints resulted in the greatest number of lost duty days. One soldier was diagnosed with an ectopic pregnancy, which resulted in 4 days of lost duty time.

Table 12. Frequency and distribution of illnesses and associated loss of duty days in officer basic trainees.

Type of Illness	Illness [a]		Total Clinic Visits [b]			Duty Days Lost		
	#	%	#	%	Mean [c]	#	%	Mean [d]
Dermis	**9**	**39.1**	**10**	**32.3**	**1.1**	**2**	**10.5**	**0.2**
Insect Bite	3	13.0	3	9.7	1.0	2	10.5	0.7
Contact Dermatitis	2	8.7	3	9.7	1.5	0	0.0	0.0
Other Dermatitis	1	4.3	1	3.2	1.0	0	0.0	0.0
Other Rash	1	4.3	1	3.2	1.0	0	0.0	0.0
Hyper pigmentation	1	4.3	1	3.2	1.0	0	0.0	0.0
Tinea Cruris	1	4.3	1	3.2	1.0	0	0.0	0.0
Respiratory	**5**	**21.7**	**6**	**19.4**	**1.2**	**3**	**15.8**	**0.6**
Upper Respiratory Infection	3	13.0	4	12.9	1.3	3	15.8	1.0
Pharyngitis	2	8.6	2	6.4	2.0	0	0.0	0.0
Urinary	**3**	**13.0**	**7**	**22.6**	**2.3**	**4**	**21.1**	**1.3**
Cystitis	1	4.3	1	3.2	1.0	0	0.0	0.0
Proteinuria	1	4.3	2	6.5	2.0	0	0.0	0.0
Urinary Tract Infection	1	4.3	3	9.7	3.0	4	21.1	4.0
Gastrointestinal	**2**	**8.7**	**2**	**6.5**	**1.0**	**1**	**5.3**	**0.5**
Gastroenteritis	1	4.3	1	3.2	1.0	1	5.3	1.0
Hemorrhoids	1	4.3	1	3.2	1.0	0	0.0	0.0
Cardiac	**1**	**4.3**	**1**	**3.2**	**1.0**	**0**	**0.0**	**0.0**
Chest Palpitations	1	4.3	1	3.2	1.0	0	0.0	0.0
Dental	**1**	**4.3**	**1**	**3.2**	**1.0**	**5**	**26.3**	**5.0**
Infected Tooth	1	4.3	2	6.5	2.0	5	26.3	5.0
Gynecological	**1**	**4.3**	**2**	**6.5**	**2.0**	**4**	**21.1**	**4.0**
Ectopic Pregnancy	1	4.3	2	6.5	2.0	4	21.1	4.0
Other	**1**	**4.3**	**1**	**3.2**	**1.0**	**0**	**0.0**	**0.0**
Headache	1	4.3	1	3.2	1.0	0	0.0	0.0
Total	**23**	**100.0**	**31**	**100.0**	**1.3**	**19**	**100.0**	**0.8**

[a] Soldiers may have more than one illness.

[b] Total Clinic Visits = initial and follow-up visits.

[c] Mean = # of clinic visits per illness.

[d] Mean = # of duty days lost per illness.

RISK FACTORS FOR INJURY AND ILLNESS

Risk Factors For Injury

Enlisted Basic Training. The relationship between any injury and age, race, and physical characteristics for enlisted basic trainees is shown in Table 13. The lightest soldiers were at significantly greater risk for an injury than the middle weight group ($p = 0.04$). There were no significant associations between injury and age, race, height, and BMI.

Table 13. Incidence of *any injury*, relative risk (RR), and 95% confidence intervals (CI) for age, race, and physical characteristics in enlisted basic trainees.

Characteristic	n	Incidence (%)	RR	95% CI
Age (years)				
18	24	66.7	1.8	0.7 - 4.5
19 - 20	8	37.5	1.0	----------
> 20	12	50.0	1.3	0.5 - 3.8
Race				
Caucasian	27	55.6	1.3	0.5 - 3.3
Black	10	70.0	1.6	0.6 - 4.2
Other	7	42.9	1.0	----------
Height (cm)				
< 158.8	15	53.3	1.1	0.5 - 2.2
158.8 - 165.5	15	66.7	1.3	0.7 - 2.5
> 165.5	14	50.0	1.0	----------
Weight (kg)				
< 56.1	14	78.6	2.0	1.0 - 3.9*
56.1 - 65.8	15	40.0	1.0	----------
> 65.8	15	53.3	1.3	0.6 - 2.9
BMI (kg/m^2)				
< 22.3	15	73.3	1.7	0.9 - 3.4
22.3 - 25.4	14	42.9	1.0	----------
> 25.4	15	53.3	1.2	0.6 - 2.7

* $p < 0.05$

Table 14 shows the relationship between any injury and APFT events for enlisted basic trainees. Soldiers who performed the 2-mile run slower than 23 minutes were at lower risk for injury than those with run times between 21.19 and 23 minutes ($p = 0.02$). There were no significant associations between any injury and push-ups and sit-ups.

Table 14. Incidence of *any injury*, relative risk (RR), and 95% confidence intervals (CI) for APFT events in enlisted basic trainees.

Event	n	Incidence (%)	RR	95% CI
2-mile run time (min)				
< 21.19	11	45.5	1.8	0.5 - 7.1
21.19 - 23.00	11	81.8	3.3	1.0 - 11.2*
> 23.00	8	25.0	1.0	----------
Push-ups (#)				
0 - 3	10	60.0	1.2	0.5 - 2.7
4 - 13	10	50.0	1.0	----------
> 13	10	50.0	1.0	----------
Sit-ups (#)				
0 - 29	11	36.4	1.0	----------
30 - 36	10	60.0	1.7	0.7 - 4.2
> 36	9	66.7	1.8	0.7 - 4.6

* $p < 0.05$

The relationship between any injury and iron status for enlisted basic trainees is shown in Table 15. There were no associations between injury and serum hemoglobin, iron, transferrin saturation, and ferritin.

Table 15. Incidence of *any injury*, relative risk (RR), and 95% confidence intervals (CI) for iron status in enlisted basic trainees.

Iron Status	n	Incidence (%)	RR	95% CI
Serum Hemoglobin (g/dl)				
< 12	3	33.3	1.0	----------
≥ 12	37	59.5	1.8	0.4 - 9.0
Serum Iron (ug/dl)				
<40	4	25.0	1.0	----------
≥ 40	36	61.1	2.4	0.4 - 13.6
Transferrin Saturation (%)				
< 20	18	50.0	1.0	----------
≥ 20	22	63.6	1.3	0.7 - 2.2
Serum Ferritin (ng/ml)				
< 20	12	41.7	1.0	----------
> 20	28	64.3	1.5	0.8 - 3.2

Table 16 shows the association of overuse injuries and age, race, and physical characteristics in enlisted basic trainees. There were no significant associations between overuse injuries and age, race, height, weight and BMI.

Table 16. Incidence of *overuse injuries*, relative risk (RR), and 95% confidence intervals (CI) for age, race, and physical characteristics in enlisted basic trainees.

Characteristic	n	Incidence (%)	RR	95% CI
Age (years)				
18	24	45.8	1.2	0.5 - 3.3
19 - 20	8	37.5	1.0	----------
> 20	12	50.0	1.3	0.5 - 3.8
Race				
Caucasian	27	40.7	1.4	0.4 - 5.0
Black	10	70.0	2.5	0.7 - 8.5
Other	7	28.6	1.0	----------
Height (cm)				
< 158.8	15	33.3	1.0	----------
158.8 - 165.5	15	60.0	1.8	0.8 - 4.1
> 165.5	14	42.9	1.3	0.1 - 3.3
Weight (kg)				
< 56.1	14	57.1	1.4	0.6 - 3.1
56.1 - 65.8	15	40.0	1.0	----------
> 65.8	15	40.0	1.0	----------
BMI (kg/m^2)				
< 22.3	15	60.0	1.7	0.7 - 3.8
22.3 - 25.4	14	35.7	1.0	----------
> 25.4	15	46.9	1.1	0.4 - 2.9

Table 17 displays the relationship between overuse injury and cardiorespiratory and muscular endurance for enlisted basic trainees. Soldiers with the highest sit-up scores (>36 sit-ups) were at greater risk for an overuse injury than individuals with the lowest scores (≤ 29 sit-ups) ($p = 0.03$). No significant associations were found for overuse injuries and 2-mile run time and push-ups.

Table 17. Incidence of *overuse injury*, relative risk (RR), and 95% confidence intervals (CI) for APFT events in enlisted basic trainees.

Event	n	Incidence (%)	RR	95% CI
2-mile run time (min)				
< 21.19	11	45.5	3.6	0.5 - 25.4
21.19 - 23.00	11	45.5	3.6	0.5 - 25.4
> 23.00	8	12.5	1.0	----------
Push-ups (#)				
0 - 3	10	40.0	1.3	0.4 - 4.5
4 - 13	10	30.0	1.0	----------
> 13	10	40.0	1.3	0.4 - 4.5
Sit-ups (#)				
0 - 29	11	18.2	1.0	----------
30 - 36	10	30.0	1.7	0.3 - 7.9
> 36	9	66.7	3.7	0.9 - 13.9*

* $p < 0.05$

Table 18 shows the association of overuse injury and iron status for enlisted basic trainees. No significant relationships were seen between overuse injury and serum hemoglobin, iron, transferrin saturation, ferritin.

Table 18. Incidence of *overuse injury*, relative risk (RR), and 95% confidence intervals (CI) for iron status in enlisted basic trainees.

Iron Status	n	Incidence (%)	RR	95% CI
Serum Hemoglobin (g/dl)				
< 12	3	33.3	1.0	----------
> 12	37	48.6	1.5	0.3 - 7.5
Serum Iron (ug/dl)				
<40	4	25.0	1.0	----------
≥ 40	36	50.0	2.0	0.4 - 11.3
Transferrin Saturation (%)				
< 20	18	44.5	1.0	----------
> 20	22	50.0	1.1	0.6 - 2.2
Serum Ferritin (ng/ml)				
<20	12	53.3	1.0	----------
≥ 20	28	53.6	1.6	0.7 - 3.8

No associations were seen between smoking and any injury ($p = 0.64$), overuse injuries ($p = 0.71$), traumatic injuries ($p = 0.71$) and wounds ($p = 0.51$) in enlisted trainees. Also, no associations were seen between alcohol and any injury ($p = 0.35$), overuse injuries ($p = 0.28$), traumatic injuries ($p = 0.71$) and wounds ($p = 0.51$). We were unable to analyze the variable "chewing tobacco use" because there was only one chewer in this population.

We did not observe a relationship between self-reported education level and any injury (high school, p = 0.68; post graduate, p = 0.21; college, p = 1.00), overuse injury (college, p = 0.68; post graduate, p = 0.81; high school, p = 1.00), traumatic injury (high school, p = 0.49; post graduate, p = 0.14; college, p = 1.00) and wounds (high school, p = 0.46; college, p = 0.75; post graduate, p = 1.00).

The logistic regression model for overuse injuries in enlisted basic trainees identified several independent risk factors. The model was based on 36 soldiers who had complete data on the variables entered into the model. Seventeen out of the 36 soldiers (47.2%) reported an overuse injury. Daily intake of vitamin A exceeding MRDA requirements was a significant risk factor for increased probability of incurring an overuse injury (p = 0.02, OR = 13.7, 95% CI = 1.5 - 126.5, Goodness-of-Fit = 0.90). For those women exceeding the MRDA (>800 RE, n = 21), 23.3% reported consuming greater than 2 times the recommendation. Black race also was significantly associated with increased risk for an overuse injury (p = 0.02, OR = 35.3, 95% CI = 1.9 - 650.0, Goodness-of-Fit = 0.90).

Officer Basic Training. Table 19 shows the association of any injury and age and physical characteristics in officer basic trainees. There were no significant associations between injury and age, height, weight, and BMI. For race, the majority of the population was Caucasian, and sample sizes were too small to analyze the non-Caucasian race groups.

Table 19. Incidence of *any injury*, relative risk (RR), and 95% confidence intervals (CI) for age and physical characteristics in officer basic trainees.

Characteristic	n	Incidence (%)	RR	95% CI
Age (years)				
< 23	15	20.0	1.7	0.3 - 8.8
23 - 26	17	11.8	1.0	----------
> 26	19	36.8	3.1	0.8 - 13.1
Height (cm)				
< 160.5	18	27.8	1.6	0.4 - 5.6
160.5 - 163.4	17	17.6	1.0	----------
> 163.4	18	27.8	1.6	0.4 - 5.6
Weight (kg)				
< 55.1	19	21.1	1.9	0.4 - 9.1
55.1 - 63.6	18	11.1	1.0	----------
> 63.6	17	41.2	3.7	0.9 - 15.4
BMI (kg/m^2)				
< 21.5	18	22.2	1.0	----------
21.5 - 23.3	18	22.2	1.0	----------
> 23.3	17	29.4	1.3	0.4 - 4.1

Table 20 represents the relationship between any injury and APFT events in officer basic trainees. There were no significant associations between injury and 2-mile run time, push-ups and sit-ups.

Table 20. Incidence of *any injury*, relative risk (RR), and 95% confidence intervals (CI) for APFT events in officer basic trainees.

Event	n	Incidence (%)	RR	95% CI
2-mile run time (min)				
< 16.5	18	16.7	1.0	----------
16.5 - 18.9	18	16.7	1.0	----------
> 18.9	18	38.9	2.3	0.7 - 7.6
Push-ups (#)				
< 28	16	25.0	1.3	0.4 -4.2
28 - 42	18	27.8	1.4	0.4 - 4.4
> 42	20	20.0	1.0	----------
Sit-ups (#)				
< 57	17	29.4	1.9	0.5 - 6.7
57 - 79	18	27.8	1.8	0.5 - 6.3
> 79	19	15.8	1.0	----------

Table 21 shows the association of any injury and iron status in officer basic trainees. No associations were found between injury and serum ferritin and transferrin saturation. Only one soldier had low values for hemoglobin and iron, so these variables were not included in the analyses.

Table 21. Incidence of *any injury*, relative risk (RR), and 95% confidence intervals (CI) for iron status in officer basic trainees.

Iron Status	n	Incidence (%)	RR	95% CI
Serum Ferritin (ng/ml)				
< 20	15	20.0	1.00	----------
≥ 20	39	25.6	1.28	0.4 - 4.0
Transferrin Saturation (%)				
< 20	13	15.4	1.00	----------
≥ 20	41	26.8	1.74	0.4 - 6.9

Table 22 shows the relationship of overuse injury with age and physical characteristics in officer basic trainees. There were no significant associations between overuse injury and age, height, weight, and BMI. Race was not included in the analysis because the majority of soldiers were Caucasian, and the sample sizes for the non-Caucasian races were too small.

Table 22. Incidence of *overuse injury*, relative risk (RR), and 95% confidence intervals (CI) for age and physical characteristics in officer basic trainees.

Characteristic	n	Incidence (%)	RR	95% CI
Age (years)				
< 23	15	6.7	1.1	0.1 - 16.6
23 - 26	17	5.9	1.0	
> 26	19	26.3	4.0	0.5 - 30.3
Height (cm)				
< 160.5	18	22.2	3.8	0.5 - 30.1
160.5 - 163.4	17	5.9	1.0	
> 163.4	18	16.7	2.8	0.3 -24.7
Weight (kg)				
< 55.1	19	5.3	1.0	----------
55.1 - 63.6	18	11.1	2.1	0.2 - 21.3
> 63.6	17	29.4	5.6	0.7 - 43.2
BMI (kg/m^2)				
< 21.5	18	5.6	1.0	----------
21.5 - 23.3	18	22.2	4.0	0.5 - 32.4
> 23.3	17	17.6	3.2	0.4 - 27.7

Table 23 displays the association of overuse injuries and APFT events in officer basic trainees. There were no associations observed between overuse injuries and 2-mile run time, push-ups and sit-ups.

Table 23. Incidence of *overuse injury*, relative risk (RR), and 95% confidence intervals (CI) for APFT events in officer basic trainees.

Event	n	Incidence (%)	RR	95% CI
2- mile run time (min)				
< 16.5	18	5.6	1.0	----------
16.5 - 18.9	18	16.7	3.0	0.3 - 26.2
> 18.9	18	22.2	4.0	0.5 - 32.4
Push-ups (#)				
< 28	16	12.5	1.3	0.2 -7.9
28 - 42	18	22.2	2.2	0.5 - 10.7
> 42	20	10.0	1.0	----------
Sit-ups (#)				
< 57	17	11.8	1.0	----------
57 - 79	18	16.7	1.4	0.3 - 7.5
> 79	19	15.8	1.3	0.3 - 7.1

Table 24 shows the relationship between overuse injury and iron status in officer basic trainees. No significant associations were seen between overuse injury, serum ferritin and transferrin saturation. A univariate analysis was not conducted for the variables serum iron and hemoglobin because only one soldier had low values.

No associations were seen between smoking and any injury ($p = 0.32$), overuse injury ($p = 0.46$), traumatic injury ($p = 0.81$) and wounds ($p = 0.67$) in officer basic trainees. Also, no relationships were seen between alcohol and any injury ($p = 0.38$), overuse injuries ($p = 0.38$), traumatic injuries ($p = 0.45$) and wounds ($p = 0.26$) in officer basic trainees.

We were unable to analyze the variable "chewing tobacco use" because there was only one chewer in the group. Also, we were unable to analyze education level because of the academically homogenous population.

Table 24. Incidence of *overuse injury*, relative risk (RR), and 95% confidence intervals (CI) for iron status in officer basic trainees.

Iron Status	n	Incidence (%)	RR	95% CI
Serum Ferritin Concentration (ng/ml)				
< 20	15	13.3	1.0	----------
≥ 20	39	15.4	1.2	0.3 - 5.1
Transferrin Saturation (%)				
< 20	13	7.7	1.0	----------
≥ 20	41	17.1	2.2	0.3 - 16.4

Risk Factors for Illness

Enlisted Basic Training. Table 25 shows the relationship between illness and age, race, and physical characteristics for enlisted basic trainees. Black race was significantly associated with increased illness risk compared to other non-Caucasian races ($p = 0.04$). Taller soldiers were at greater risk for illness than the shorter individuals (middle vs. shortest, $p = 0.03$; tallest vs. shortest, $p = 0.04$). Individuals in the lowest BMI group were at greater risk for illness than those in the highest BMI group ($p = 0.02$). No relationships were found between illness and age and body weight.

Table 25. Incidence of *any illness*, relative risk (RR), and 95% confidence intervals (CI) for age, race, and physical characteristics in enlisted basic trainees.

Characteristic	n	Incidence (%)	RR	95% CI
Age (years)				
18	24	75.0	1.8	0.9 - 3.7
19 - 20	8	62.5	1.5	0.6 - 3.5
> 20	12	41.7	1.0	----------
Race				
Caucasian	27	68.8	1.4	0.6 - 3.4
Black	10	90.0	2.1	0.9 - 5.1*
Other	7	42.9	1.0	----------
Height (cm)				
< 158.8	15	33.3	1.0	----------
158.8 - 165.5	15	86.7	2.6	1.2 - 5.5 *
> 165.5	14	71.4	2.1	1.0 - 4.7*
Weight (kg)				
< 56.1	14	78.6	1.5	0.9 - 2.6
56.1 - 65.8	15	53.3	1.0	----------
> 65.8	15	60.0	1.1	0.6 - 2.1
BMI (kg/m^2)				
< 22.3	15	86.7	1.9	1.0 - 3.3*
22.3 - 25.4	14	57.1	1.2	0.6 - 2.5
> 25.4	15	46.7	1.0	----------

* $p < 0.05$

The relationship between illness and APFT events is displayed in Table 26. No significant associations were seen between illness risk and 2-mile run time, push-ups and sit-ups.

Table 26. Incidence of *any illness*, relative risk (RR), and 95% confidence intervals (CI) for APFT events in enlisted basic trainees.

Event	n	Incidence (%)	RR	95% CI
2- mile run time (min)				
< 21.2	11	81.8	1.3	0.7 - 2.4
21.2 - 23.0	11	63.6	1.0	0.5 - 2.1
> 23.0	8	62.5	1.0	----------
Push-ups (#)				
0 - 3	10	50.0	1.0	----------
4 - 13	10	90.0	1.8	0.9 - 3.5
> 13	10	70.0	1.4	0.7 - 2.9
Sit-ups (#)				
0 - 29	11	54.5	1.0	----------
30 - 36	10	80.0	1.5	0.8 - 2.7
> 36	9	71.8	1.4	0.8 - 2.7

Table 27 shows the relationship between any illness and iron status. There were no significant associations between initial serum hemoglobin, ferritin, iron, transferrin saturation and illness risk.

Table 27. Incidence of *any illness*, relative risk (RR), and 95% confidence intervals (CI) for iron status in enlisted basic trainees.

Iron Status	n	Incidence (%)	RR	95% CI
Hemoglobin (g/dl)				
< 12	3	100.0	1.5	1.2 - 2.0
≥ 12	37	64.9	1.0	----------
Serum Ferritin (ng/ml)				
< 20	12	83.3	1.4	0.9 - 2.0
≥ 20	28	60.7	1.0	----------
Serum Iron (ug/dl)				
< 40	4	100.0	1.6	1.2 - 2.0
≥ 40	36	63.9	1.0	----------
Transferrin Saturation (%)				
< 20	18	77.8	1.3	0.9 - 2.0
≥ 20	22	59.1	1.0	----------

The logistic regression analysis for any illness in enlisted basic trainees was based on 34 soldiers who had complete data for the variables entered into the model. Twenty-one out of 34 soldiers (61.8%) reported an illness. Daily intake of niacin > 15 mg before beginning training was also associated with increased illness risk ($p = 0.02$, OR = 7.0, 95% CI =1.3 - 38.3, Goodness-of-Fit 0.15). For those women reporting niacin intakes exceeding the MRDA (> 16 mg, n = 33), 8.3% reported greater than 2 times the recommendation.

The association between infectious illness and age, race, and physical characteristics is shown in Table 28. Black race was significantly associated with increased risk of infectious illnesses compared with the other non-Caucasian races ($p = 0.04$). Taller individuals were significantly at greater risk for developing infectious illnesses than their shorter counterparts (middle vs. shortest, $p = 0.01$; tallest vs. shortest, $p = 0.04$). No significant associations were noted between infectious illness and age, body weight, and BMI.

Table 28. Incidence of *infectious illness*, relative risk (RR), and 95% confidence intervals (CI) for age, race, and physical characteristics in enlisted basic trainees.

Characteristic	n	Incidence (%)	RR	95% CI
Age (years)				
18	24	58.3	2.3	0.8 - 6.6
19 - 20	8	50.0	2.0	0.6 - 6.6
> 20	12	25.0	1.0	----------
Race				
Caucasian	27	40.7	1.4	0.4 - 5.0
Black	10	80.0	2.8	0.8 - 9.4*
Other	7	28.6	1.0	----------
Height (cm)				
< 158.8	15	20.0	1.0	----------
158.8 - 165.5	15	66.7	3.3	1.1 - 9.8*
> 165.5	14	57.1	2.9	0.9 - 8.7*
Weight (kg)				
< 56.1	14	64.3	1.9	0.9 - 4.4
56.1 - 65.8	15	33.3	1.0	----------
> 65.8	15	46.7	1.4	0.6 - 3.4
BMI $(kg/m)^2$				
< 22.3	15	66.7	1.9	0.9 - 4.1
22.3 - 25.4	14	35.7	1.0	----------
> 25.4	15	40.0	1.1	0.4 - 2.9

* $p < 0.05$

Table 29 shows the relationship between infectious illness and APFT events. There were no significant associations between infectious illness and 2-mile run time, sit-ups, and push-ups.

Table 29. Incidence of *infectious illness*, relative risk (RR), and 95% confidence intervals (CI) for APFT events in enlisted basic trainees.

Event	n	Incidence (%)	RR	95% CI
2- mile run time (min)				
< 21.1	11	72.7	2.00	0.9 - 4.7
21.1 - 23.0	11	36.4	1.00	----------
> 23.0	8	50.0	1.38	0.5 - 3.9
Push-ups (#)				
0 - 3	10	30.0	1.00	----------
4 - 13	10	70.0	2.33	0.8 - 6.5
> 13	10	60.0	2.00	0.7 - 5.9
Sit-ups (#)				
0 - 29	11	36.4	1.00	----------
30 - 36	10	70.0	1.92	0.8 - 4.6
> 36	9	55.6	1.53	0.6 - 4.1

The relationship between infectious illness and iron status is displayed in Table 30. Low initial serum ferritin levels were significantly associated with increased risk for developing an infectious illness ($p = 0.04$). There were no significant associations between serum hemoglobin, iron, transferrin saturation (%) and increased infectious illness risk.

Table 30. Incidence of *infectious illness*, relative risk (RR), and 95% confidence intervals for iron status in enlisted basic trainees.

Iron Status	n	Incidence (%)	RR	95% CI
Serum Hemoglobin (g/dl)				
< 12	3	66.7	1.4	0.6 - 3.3
≥ 12	37	48.6	1.0	----------
Serum Ferritin (ng/ml)				
< 20	12	75.0	1.9	1.1 - 3.4*
≥ 20	28	39.3	1.0	----------
Serum Iron (ug/dl)				
< 40	4	100.0	2.3	1.6 - 3.2
≥ 40	36	44.4	1.0	----------
Transferrin Saturation (%)				
< 20	18	44.4	1.0	----------
≥ 20	22	54.5	1.2	0.7 - 2.3

* $p < 0.05$

No significant associations were seen between smoking and either any illness ($p = 0.78$) or infectious illness ($p = 0.67$) in enlisted trainees. Also, no significant relationships were seen between alcohol and any illness ($p = 0.30$) and infectious illness ($p = 0.67$). We were unable to analyze the variable "chewing tobacco use" because there was only one chewer.

No relationships were seen between self-reported education level and any illness (high school, $p = 0.94$; college, $p = 1.00$; post graduate, $p = 0.26$) or infectious illness (high school, $p = 1.00$; college, $p = 0.90$; post graduate, $p = 0.90$) for enlisted trainees.

The logistic regression model for the risk of developing an infectious illness is summarized in Table 31. The model was based on 44 trainees with complete data on the variables analyzed in the model. Twenty-two out of 44 trainees (50.0%) reported an infectious illness. Black race and low serum ferritin levels (< 20 ng/ml) were risk factors for infectious illness independent of other factors studied.

Table 31. Logistic regression model summary for infectious illnesses for enlisted basic trainees.

Characteristic	OR †	95% CI ✦	P-value	Goodness of Fit
Race (Black)	36.1	1.8 - 730.2	0.02	0.2
Ferritin (<20 ng/ml)	6.4	1.2 - 34.6	0.03	0.2

† Odds ratios

✦ Confidence intervals

Officer Basic Training. Table 32 shows the relationship between any illness and age and physical characteristics in officer basic trainees. No associations were found between these variables and any illness. We did not analyze race because the majority of the population was Caucasian, and sample sizes were too small for the non-Caucasian groups.

Table 32. Incidence of *any illness*, relative risk (RR), and 95% confidence intervals (CI) for age and physical characteristics in officer basic trainees.

Characteristic	n	Incidence (%)	RR	95% CI
Age (years)				
< 23	15	20.0	1.0	----------
23 - 26	17	41.2	2.1	0.6 - 6.6
> 26	19	31.6	1.6	0.5 - 5.3
Height (cm)				
< 160.5	18	27.8	1.0	----------
160.5 - 163.4	17	41.2	1.5	0.6 - 3.8
> 163.4	18	27.8	1.0	----------
Weight (kg)				
< 55.1	19	31.6	1.1	0.4 - 2.9
55.1 - 63.6	18	33.3	1.1	0.4 - 3.0
> 63.6	17	29.4	1.0	----------
BMI (kg/m^2)				
< 21.5	18	27.8	1.2	0.4 - 3.7
21.5 - 23.3	18	44.4	1.9	0.7 - 5.1
> 23.3	17	23.5	1.0	----------

Table 33 summarizes the relationship between any illness and APFT events in officer basic trainees. No significant associations were seen between 2-mile run time, push-ups, sit-ups and increased risk for illness.

Table 33. Incidence of *any illness*, relative risk (RR), and 95% confidence intervals (CI) for APFT events in officer basic trainees.

Event	n	Incidence (%)	RR	95% CI
2-mile run time (min)				
< 16.5	18	27.8	1.0	----------
16.5 - 18.9	18	27.8	1.0	----------
> 18.9	18	38.9	1.4	0.5 - 3.6
Push-ups (#)				
< 28	16	37.5	2.3	0.7 -7.6
28 - 42	18	16.7	1.0	----------
> 42	20	40.0	2.4	0.8 - 7.7
Sit-ups (#)				
< 57	17	35.3	1.3	0.5 - 3.6
57 - 79	18	33.3	1.3	0.5 - 3.4
> 79	19	26.3	1.0	----------

Table 34 shows the relationship between any illness and iron status. No significant associations were seen between any illness and serum ferritin and transferrin saturation. Univariate analyses did not include serum iron and hemoglobin because only one soldier had low values.

Table 34. Incidence of *any illness*, relative risk (RR), and 95% confidence intervals (CI) for iron status in officer basic trainees.

Iron Status	n	Incidence (%)	RR	95% CI
Serum Ferritin Concentration (ng/ml)				
< 20	15	20.0	1.0	----------
≥ 20	39	35.9	1.8	0.6 - 5.4
Transferrin Saturation (%)				
< 20	13	38.5	1.3	0.6 - 3.0
≥ 20	41	29.3	1.0	----------

Table 35 displays the relationship between infectious illness and age and physical characteristics. No significant associations were seen between risk of infectious illness and age, height, weight, and BMI. Race was not analyzed because of the small sample sizes for the non-Caucasian groups.

Table 36 summarizes the relationship between infectious illness and APFT events in officer basic trainees. No significant associations were seen between infectious illness risk and 2-mile run time, push-ups and sit-ups.

Table 35. Incidence of *infectious illness*, relative risk (RR), and 95% confidence intervals (CI) for age, and physical characteristics in officer basic trainees.

Characteristic	n	Incidence (%)	RR	95% CI
Age (years)				
< 23	15	13.3	1.0	----------
23 - 26	17	23.5	1.8	0.4 - 8.3
> 26	19	15.8	2.2	0.3 - 19.1
Height (cm)				
< 160.5	18	22.2	1.9	0.4 - 9.0
160.5 - 163.4	17	11.8	1.0	----------
> 163.4	18	22.2	1.9	0.4 - 9.0
Weight (kg)				
< 55.1	19	26.3	2.4	0.5 - 10.7
55.1 - 63.6	18	11.1	1.0	----------
> 63.6	17	17.6	1.6	0.3 - 8.4
BMI (kg/m^2)				
< 21.5	18	16.7	1.4	0.3 - 7.5
21.5 - 23.3	18	27.8	2.4	0.5 - 10.6
> 23.3	17	11.8	1.0	----------

Table 36. Incidence of *infectious illness*, relative risk (RR), and 95% confidence intervals (CI) for APFT events in officer basic trainees.

Event	n	Incidence (%)	RR	95% CI
2 mile run time (min)				
< 16.54	18	16.7	1.0	----------
16.54 - 18.97	18	16.7	1.0	----------
> 18.97	18	22.2	1.3	0.4 - 5.1
Push-ups (#)				
< 28	16	12.2	1.0	----------
28 - 42	18	16.7	1.3	0.3 - 7.0
> 42	20	25.0	2.0	0.5 - 9.0
Sit-ups (#)				
< 57	17	23.5	2.1	0.4 - 10.1
57 - 79	18	11.1	1.0	----------
> 79	19	21.1	1.9	0.4 - 9.1

Table 37 shows the relationship between infectious illness and iron status. No associations were seen between infectious illness risk and initial serum ferritin and transferrin saturation levels. Univariate analysis was not performed on serum iron and hemoglobin variables because only one soldier had low levels.

Table 37. Incidence of *infectious illness*, relative risk (RR), and 95% confidence intervals (CI) for iron status in officer basic trainees.

Iron Status	n	Incidence (%)	RR	95% CI
Serum Ferritin Concentration (ng/ml)				
< 20	15	20.0	1.1	0.3 - 3.8
≥ 20	39	17.1	1.0	----------
Transferrin Saturation (%)				
< 20	13	15.4	1.0	----------
≥ 20	41	19.5	1.3	0.3 - 5.2

No significant relationships were seen between smoking and any illness ($p = 0.94$) and infectious illness ($p = 0.50$). Also, no significant associations were seen between alcohol and any illness ($p = 0.97$) and infectious illness ($p = 0.48$).

The variable "chewing tobacco use" was not included in the analyses because there was only one chewer in the group. Also, the variable "education level" was not analyzed due to the homogeneity of the population.

DISCUSSION

This study determined that the cumulative incidence of injury was equal to that of illness (59.1% vs. 59.1%) in the enlisted basic trainees. However, the morbidity in terms of restricted and lost duty time was twice as great for injuries than illnesses. The average lost duty time per injury was fivefold greater than for each illness. These findings are consistent with other enlisted basic trainee studies (Jones et al., 1988; Westphal et al., 1996). Respiratory complaints accounted for the majority of illnesses and resulted in the greatest amount of lost duty time. Similar findings have also been reported in other basic trainee studies (Jones et al., 1988, Brundage et al., 1988).

The cumulative incidence of illnesses slightly exceeded that of injuries in officer basic trainees (31.5% vs 24.1%). However, injury was a far more important cause of morbidity where total duty days lost was five times greater than for illnesses. The average days lost per injury was seven times greater compared to illnesses.

Most of the injuries in the officer basic trainees involved either the lower extremities or lower back. These findings again are consistent with previously published reports on enlisted basic trainees (Jones et al., 1988; Westphal et al., 1996).

Direct comparisons are difficult between enlisted basic trainees and officer trainees, since the types and volume of training and sites of training are different. However, the incidence rate of injury was over twice as high in enlisted trainees than officer trainees. Other studies show similar high injury rates for enlisted basic trainees (Jones et al., 1988; Westphal, et al., 1996). Several factors may account for the apparently lower injury rate among the officer basic trainees: 1) self-treatment of minor injuries (majority had a medical background), and 2) less intense physical training program (Gardner et al., 1988). Another factor could be higher fitness in the officer basic trainees. Studies have shown that lower fitness was associated with increased risk for injuries in enlisted basic trainees (Westphal et al., 1996; Jones et al., 1988; Jones, et al. 1992). Our findings for enlisted trainees were not consistent with the findings in these studies. However, in officer trainees there was a higher risk for injury with lower fitness.

The average duty days lost per injury was 1.5 times higher in the officer basic trainees than enlisted basic trainees suggesting that injuries were more severe in the officer group. A plausible explanation for this finding may be that the officers self-treated

minor injuries and only sought care for the severe injuries.

The incidence rate of illness was almost twice as high in the enlisted basic trainees than officer trainees. Westphal et al. (1996) reported an incidence rate of 28.5 illnesses per 100 enlisted basic trainees per month which is similar to our findings. In addition, the average duty days lost per illness were lower in the officer basic trainees. A possible explanation for these differences could be that the officer basic trainees were more experienced with preventive measures to reduce illnesses since a majority of them had prior medical training (e.g., nurses, veterinarians).

We did not find any significant risk factors for injury or illness in the officer trainees. The officers were a homogenous small group. Perhaps we would have different findings in a larger population study.

Excessive daily intake of vitamin A (greater than MRDA requirements) prior to basic training was the strongest risk factor for overuse injuries in enlisted basic trainees. Chronic toxic levels of vitamin A (10 times RDA) have been associated with bone and muscle pain (Nesher and Zuckner, 1995; Olson, 1994; Wilson et al., 1991). Vitamin A plays a role in the synthesis of glycoprotein which is important for bone and soft tissue cell function (Wilson et al., 1991). Even though reported daily intake of vitamin A was not approaching toxic levels in this study, the mean intakes of the enlisted trainees were much higher than recently reported intakes of women age 20-29 in the third National Health and Nutrition Examination Survey (Interagency Board for Nutrition Monitoring and Related Research, 1995).

Black race was also a significant risk factor for overuse injuries in enlisted basic trainees. Zigmont et al. (1998) showed that non-Caucasian (primarily black) construction engineers were at increased risk for overuse injuries (i.e., tendinitis, muscle strains). However, Gardner et al. (1988) reported a higher bone stress injury rate in Caucasian Marine recruits than black recruits and Schmidt-Brudvig et al. (1983) showed a similar finding in Army trainees. Also, other studies show a higher incidence of blisters in Caucasian soldiers than black soldiers (Knapik et al.,1997; White et al., 1997; Reynolds et al., 1998). Perhaps individuals of certain ethnic backgrounds may be at higher risk for specific types of injuries. For example, Caucasians have lower bone density than blacks (Trutter, et al., 1960) which is a possible reason for higher risk for stress fractures. However, incidence of soft tissue type injuries such as tendinitis and muscle strains may

be lower in Caucasians than blacks as suggested by our study.

Low body weight was significantly associated with higher injury incidence in the enlisted basic trainees. These findings agree with Jones et al. (1992) who reported that leaner (low BMI) recruits were at greater risk for injury during training. These authors suggested that individuals with low body mass or low BMI may not have enough muscle mass to support their weight during the stress of vigorous physical training.

Higher cardiorespiratory endurance (i.e., 2-mile run time) and muscular endurance (i.e., sit-ups) were risk factors for injuries in enlisted trainees. These are surprising findings not supported by other studies (Jones et al.,1988; Jones et al., 1992; Westphal et al., 1996). Also, in officers while not significant we found the risk for injury to be 4 times higher for the less fit group than the most fit group. Possible reasons for our findings in enlisted trainees include small population size or a spurious result.

Daily intake of niacin >15 mg was the strongest predictor for illnesses in enlisted trainees. Niacin is an essential component of nicotinamide adenine dinucleotide and other co-enzymes important for metabolism and immune processes (Wilson et al., 1991). Illnesses have been reported for niacin intakes greater than 10 times RDA (Gibbons et al., 1995; Wilson et al., 1991). Even though mean intakes of niacin in our study did not approach these toxic levels, 8.3% of the women reported consuming greater than two times the RDA.

For enlisted trainees, black race was also the strongest risk factor for infectious illnesses, particularly respiratory infections. Racial comparisons for infections have been made in other studies (Desenclos and Hahn, 1992; Overfield, 1995). Premature mortality from infectious illnesses such as pneumonia and influenza are much higher in black women than non-black races (Desenclos and Hahn, 1992). Differences in diseases among races may be due to such factors as genetics and anatomical variations (Overfield, 1995).

Low serum ferritin was also a significant risk factor for infectious illnesses in enlisted trainees. Serum ferritin is a parameter for evaluating iron stores in the body tissues. Levels less than 20 ng/ml indicate deficient iron stores (Harris, 1995). Iron plays an important role in cell metabolism. Impaired protein synthesis and T and B cell function have been reported in iron deficient states (Dada-Latunde and Young, 1992; Good et al., 1988). Altered immunity and increased susceptibility to infection is a plausible explanation

for our findings.

Again for enlisted trainees, the leanest were at greater risk for illness. This has been reported in other studies (Nattio et al., 1994). It may be that these individuals do not have the metabolic reserves to withstand the stresses of basic training. Similar problems have been seen with athletes with disordered eating patterns (Nattio et al., 1994).

Taller enlisted females were at greater risk for illnesses which were primarily respiratory infections. Other studies do not support this finding. Le Souef et al. (1995) reported abnormal airway responsiveness in shorter children. Rosenthal et al. (1993) showed a linear relationship between lung volumes and other measurements and height in children. Voss et al. (1992) reported an increased prevalence of illnesses in shorter school children. Perhaps our finding is spurious. The size of our study population is also smaller than the other research investigations.

CONCLUSIONS

1. Injuries are the major causes of morbidity in both enlisted and officer women during basic training.

2. Overuse injuries are the most commonly reported injuries in both enlisted and officer female trainees.

3. Respiratory and dermatological complaints are the most commonly reported illnesses in both enlisted and officer trainees.

4. The incidences of injury and illness are much higher in enlisted women than officer women during basic training.

5. Excessive intake of vitamin A prior to training and black race are risk factors for development of injuries in enlisted women during basic training.

6. Marginally excessive intake of niacin prior to training is a risk factor for any illness in enlisted women during basic training.

7. Black race and low initial serum ferritin level are risk factors for development of infectious illness in enlisted women during basic training.

8. Higher fitness is a risk factor for injury in enlisted women but not in officer women during basic training.

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APPENDIX

Name: _____

Subject Number: _____

HEALTH PERFORMANCE AND NUTRITIONAL STATUS QUESTIONNAIRE

This questionnaire asks you a variety of questions about your background, health and eating behavior and patterns. Please answer each question honestly and thoughtfully, since the information you provide will help determine the relationship between what you eat and your general health.

This questionnaire is divided into three sections as follows:

A: Background Questions
B: Health Habits and Medical History
C: Eating Habits and Food Preferences Questions

Please use a number two pencil to fill in the ovals.

Proper Mark

Completing the questionnaire will take about 20 minutes. When you are finished, please check to make sure that you have responded to all of the items.

Thank you for filling this out.

Subject Number:_____

SECTION A: BACKGROUND QUESTIONS

1. What is your date of birth? _____(~~day~~/month/year)

2. What was your age on your last birthday? _____YEARS

3. What is your height? _____FEET_____INCHES

4. What is your weight? _____POUNDS

5. Are you trying to LOSE weight? ◯ YES ◯ NO

6. Are you trying to GAIN weight? ◯ YES ◯ NO

7. How much would you like to weigh? _____POUNDS

8. Have you lost weight in the past year? (Please answer even if you regained the weight you had lost)

   ◯ YES ◯ NO

   If YES, how many pounds did you lose? _____POUNDS

9. Have you gained weight in the past year? (please answer even if you relost the weight you had gained)

   ◯ YES ◯ NO

   If YES, how many pounds did you gain? _____POUNDS

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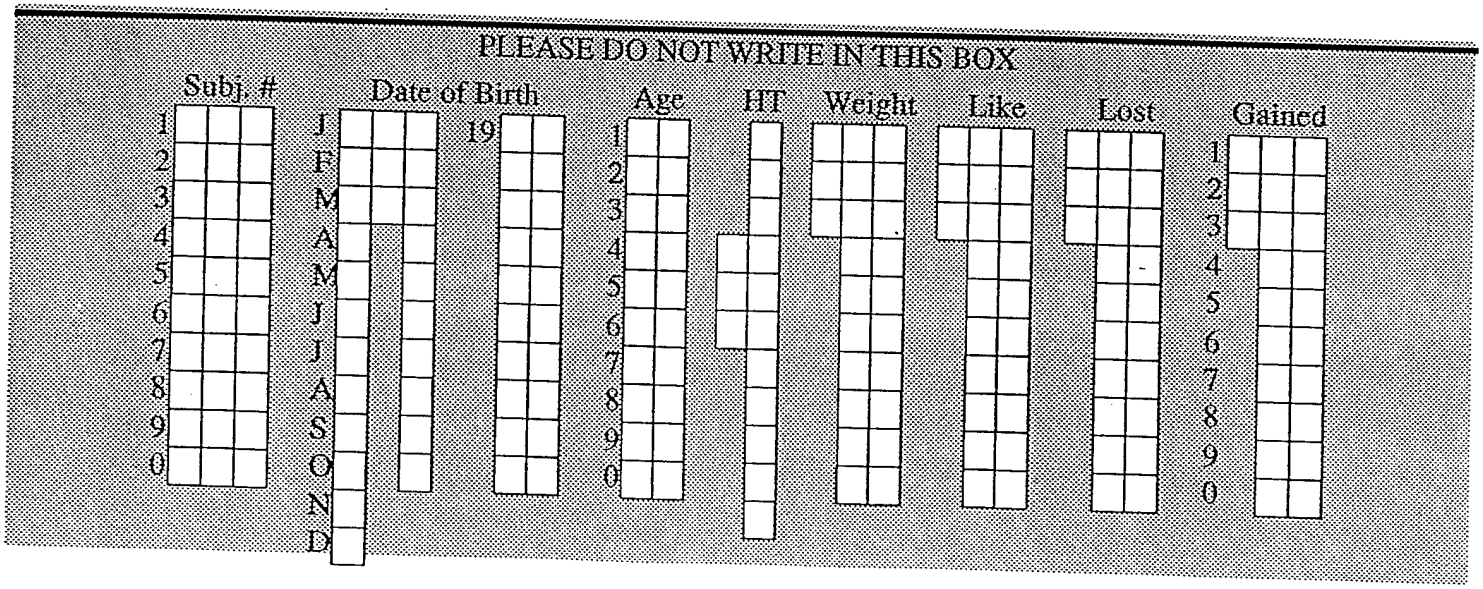

10. Indicate the number of years of education you have completed. Please fill in one oval.

- ◯ High School Graduate or GED
- ◯ College: number of years completed: _____
- ◯ Post-Graduate: number of years completed: _____

11. Which ethnic/racial group do you belong to? Please fill in one oval.

- ◯ American Indian/Alaskan Native/Eskimo
- ◯ Asian/Pacific Islander
- ◯ Black/African
- ◯ Hispanic
- ◯ White/Caucasian, not of Hispanic origin
- ◯ Other (please specify): _____

12. In what part of the country did you live the longest before age 16? Please fill in one oval.

- ◯ New England (ME, NH, VT, MA, RI, CT)
- ◯ Middle Atlantic (NY, NJ, PA)
- ◯ East North Central (MI, WI, OH, IN, IL)
- ◯ West North Central (MN, ND, SD, IA, NE, MO, KS)
- ◯ South Atlantic (DE, MD, DC, WV, VA, NC, SC, GA, FL)
- ◯ East South Central (KY, TN, AL, MS)
- ◯ West South Central (AR, OK, LA, TX)
- ◯ Mountain (MT, ID, WY, CO, UT, NV, NM, AZ)
- ◯ Pacific (WA, OR, CA, AK, HI)
- ◯ Other (please specify): _____

13. In what type of community did you live the longest before age 16? Please fill in one oval.

- ◯ In the Central City of a Metropolitan Area
- ◯ In the Suburbs of a Metropolitan Area (Non-rural and not in the Central City)
- ◯ In a Non-metropolitan (Rural) Area
- ◯ Other (please specify): _____

14. What is your marital status? Please fill in one oval.

- ◯ Single, never been married
- ◯ Married
- ◯ Not Married (Widowed/Divorced)

PLEASE DO NOT WRITE IN THIS BOX

College
1 2 3 4 5 6 7 8 9 0
Post-Graduate

Ethnic
1 2 3 4 5 6 7 8 9 0

Region
1 2 3 4 5 6 7 8 9 0

Type
1 2 3 4 5 6 7 8 9 0

Subject Number:_____

SECTION B: HEALTH HABITS AND MEDICAL HISTORY

1. Have you smoked one or more cigarettes in the last year?
   - ○ YES
   - ○ NO

   a. Do you smoke cigarettes now?
   - ○ YES
   - ○ NO

   If YES: a. on the average, about how many cigarettes a day do you smoke now?
   - ○ Less than 10 cigarettes per day
   - ○ 10-20 cigarettes per day
   - ○ More than 20 cigarettes per day

   b. How long have you smoked? _____ YEARS_____MONTHS

   b. If you have quit smoking, how long ago did you quit? _____ YEARS_____MONTHS

2. Do you have a family history of osteoporosis? (ie., did either your mother or grandmother develop a 'stooped over' appearance or break their hip?)
   - ○ YES
   - ○ NO
   - ○ Not sure/I don't know

3. Do you use birth control?
   - ○ YES
   - ○ NO

   If YES, which of the following do you use? Please fill in one oval. If you do not use any that are listed, please indicate "None of the above".
   - ○ Birth control pills
   - ○ IUD
   - ○ Contraceptive sponge
   - ○ Diaphram
   - ○ Cervical cap
   - ○ None of the above

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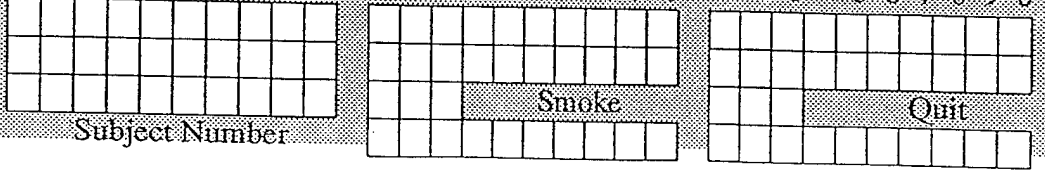

4. How old were you when you had your first menstrual period?

- ◯ 9 years old
- ◯ 10 years old
- ◯ 11 years old
- ◯ 12 years old
- ◯ 13 years old
- ◯ 14 years old
- ◯ Other age, specify:_____

5. Do you have regular periods?

- ◯ YES
- ◯ NO

If YES, approximately how many days elapse between (day 1 to day 1) periods? _____days

6. How many days does your period last? _____days

7. For how many days do you have your heaviest flow? _____days

8. Do you use tampons?

- ◯ YES
- ◯ NO

If YES, which type do you use?

- ◯ Regular
- ◯ Super

What is the average number of tampons you use per day? _____ tampons

How saturated do they become?

- ◯ Light saturation
- ◯ Medium saturation
- ◯ Heavy saturation

PLEASE DO NOT WRITE IN THIS BOX

age 0 1 2 3 4 5 6 7 8 9

5a 0 1 2 3 4 5 6 7 8 9

6a 0 1 2 3 4 5 6 7 8 9

7 0 1 2 3 4 5 6 7 8 9

9. Do you use pads?

- YES
- NO

If YES, which type do you use?

- Regular
- Super

What is the average number of pads you use per day ? _____ pads

How saturated do they become?

- Light saturation
- Medium saturation
- Heavy saturation

10. Have you ever missed your period for 3 months or longer WITHOUT being pregnant?

- YES
- NO

11. Have you ever had bleeding between periods?

- No
- Once
- Several times
- Frequently

12. Have you ever been pregnant?

- YES
- NO

13. Have you ever been told by a health care provider that you were anemic or had low iron levels in your blood?

- YES
- NO

If YES, did you take iron pills for your condition?

- YES
- NO

14. Did you have any side effects from the supplements?

- YES
- NO

If YES, what kind?

9a 0 1 2 3 4 5 6 7 8 9

PLEASE DO NOT WRITE IN THIS BOX

0 1 2 3 4 5 6 7 8 9 10a

Subject Number:_____ ○

SECTION C: EATING HABITS AND FOOD PREFERENCE QUESTIONS

1. Prior to entering the U.S. Army, where did you usually eat? (select one place for each meal)

	Breakfast	Lunch	Dinner
At a private residence	○	○	○
At a club/restaurant/snack shop	○	○	○
At a dormitory	○	○	○
Bought food at a vending machine	○	○	○
Bought food at a mobile truck	○	○	○
Skipped the meal	○	○	○
Other, specify:_____	○	○	○

2. How much do you like or dislike the following foods?

NEVER TRIED 0	DISLIKE EXTREMELY 1	DISLIKE VERY MUCH 2	DISLIKE MODERATELY 3	DISLIKE SLIGHTLY 4	NEITHER LIKE NOR DISLIKE 5	LIKE SLIGHTLY 6	LIKE MODERATELY 7	LIKE VERY MUCH 8	LIKE EXTREMELY 9

	0	1	2	3	4	5	6	7	8	9
Milk	○	○	○	○	○	○	○	○	○	○
Cheese	○	○	○	○	○	○	○	○	○	○
Yogurt	○	○	○	○	○	○	○	○	○	○
Liver	○	○	○	○	○	○	○	○	○	○
Spinach	○	○	○	○	○	○	○	○	○	○
Red Meats	○	○	○	○	○	○	○	○	○	○
Eggs	○	○	○	○	○	○	○	○	○	○

3. How often do you drink tea within one hour before or after a meal?

○ 3 Meals per Day ○ 2 Meals per Day ○ 1 Meal per Day ○ Occasionally ○ Never

4. How often do you drink orange juice within one hour before or after breakfast?

○ Always ○ Occasionally ○ Never

PLEASE DO NOT WRITE IN THIS BOX

Subject Number 1 2 3 4 5 6 7 8 9 0

Q1 Other 1 2 3 4 5 6 7 8 9 0

5. What do you think is the recommended intake level for grams of total dietary fiber? Please fill in one oval.

- ◯ 5 to 10 grams per day
- ◯ 11 to 15 grams per day
- ◯ 16 to 20 grams per day
- ◯ 25 to 35 grams per day

6. In order to achieve a healthy diet, do you specifically do any of the following? Please indicate as many as apply to you.

- ◯ I eat more vegetables
- ◯ I eat more fruit
- ◯ I eat more poultry or chicken
- ◯ I eat more whole-grain breads and cereals
- ◯ I eat more fish
- ◯ I eat lower fat dairy products
- ◯ I eat leaner meats and beef

7. What do you think is the recommended number of servings of fruits and vegetables you should eat on a daily basis? (1 serving is equal to 1/2 cup cooked or 1 medium size fresh)

- ◯ 5 servings
- ◯ 4 servings
- ◯ 3 servings
- ◯ 2 servings

8. Which one of the following statements best describes how you make your decision on the type of bread you eat? Please fill in one oval.

- ◯ I select white bread only
- ◯ I look for bread that comes in a dark wrapper
- ◯ I look for bread that has a dark, whole-grain appearance
- ◯ I check every wrapper to make sure the bread is whole-grain

9. Which you of the following statements best describes how often you read the label for bread or cereal products you buy for the FIRST time? Please fill in one oval.

- ◯ I read the label for all the products I buy for the first time
- ◯ I read most of the labels for the products I buy for the first time
- ◯ I read a few of the labels for the products I buy for the first time
- ◯ I don't read any of the labels for the products I buy for the first time

10. Which of the following cereals do you think are whole-grain? Please fill in as many ovals as apply.

- ◯ Kellogg's Raisin Bran
- ◯ Kellogg's Product 19
- ◯ Kellogg's Special K
- ◯ Kellogg's Complete Bran Flakes
- ◯ Kellogg's Corn Flakes
- ◯ Kellogg's Rice Krispies

11. Which of type of bread would have the following list of ingredients? Please fill in one oval.

"Enriched unbleached wheat flour, water, corn syrup, cracked wheat, wheat gluten, yeast, honey, salt, molasses, partially hydrogenated soybean oil, raisin syrup, ethoxylated mono- and diglycerides, vinegar, calcium sulfate"

- ◯ White bread
- ◯ Wheat bread
- ◯ Whole wheat bread
- ◯ Raisin bread

DIET HISTORY AND HABITS QUESTIONNAIRE

This form asks you a variety of questions about your backround and habits which may affect or be related to your health. The information you provide will help ration developers or program planners better meet your needs and help determine your nutritional fitness. Your answers will be kept confidential. This questionnaire will take about 30 minutes to complete. Please answer honestly and thoughtfully. Please use a number two pencil to fill in the bubbles. When you are finished, please double check to make sure that you have responded to all of the items. Thank you.

Please indicate your subject number.

_____

1. During the past year, have you taken any vitamins or minerals?

◯ NO ◯ YES, fairly regularly ◯ YES, but not regularly If YES:

If YES, please indicate the type and number of pills per Day, Week, Month or Year.

Multiple Vitamins	none	1	2	3	4	5	6	7	8+	Day	Week	Month	Year
One-a-day type	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
Stress-tabs type	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
Therapeutic, Theragran type	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯

Other Vitamins	none	1	2	3	4	5	6	7	8+	Day	Week	Month	Year
Vitamin A	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
Vitamin C	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
Vitamin E	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
Calcium or dolomite	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯

For the Other Vitamins, please indicate below how many milligrams or IUs per pill you take.

Vitamin A _____ IU per pill
Vitamin C _____ mg per pill
Vitamin E _____ IU per pill
Calcium or dolomite _____ mg per pill

Other Supplements (please fill in all that apply)

◯ Yeast ◯ Selenium ◯ Zinc ◯ Iron ◯ Beta-Carotene ◯ Cod Liver Oil ◯ Other:_____

Please list the brand of multiple vitamin/mineral you usually take: _____

PLEASE DO NOT WRITE IN THIS BOX

0 1 2 3 4 5 6 7 8 9 other

0 1 2 3 4 5 6 7 8 9 vitamins

Subject Number

A

C

0 1 2 3 4 5 6 7 8 9 E

0 1 2 3 4 5 6 7 8 9 Ca

2. Are you on a special diet? Please fill in no more than two bubbles.

○ No	○ Low Fat	○ High Carbohydrate
○ Weight Loss	○ Vegetarian	○ Low Cholesterol
○ Weight Gain	○ High Protein	○ Low Salt

3. The following section is about your USUAL eating habits. Thinking back over the past year, indicate how often do you usually eat the foods listed on the next 4 pages.

Instructions:
First, indicate whether your usual serving size is small, medium or large. (A small portion is about one-half the medium serving size shown, or less; a large portion is about one-and-a-half times as much, or more.)

Then, fill in a bubble for the number of times you usually eat each item and fill a bubble for the time period. For example, you may eat bananas twice a week (fill in a bubble under "2" and a bubble under "week"). If you never eat the food, fill in the bubble under "none". Please DO NOT SKIP foods. Please BE CAREFUL which bubble you fill in. It will make a big difference if you say "Hamburger once a day" when you mean "Hamburger once a week"!
Some items say "in season." Please indicate how often you eat these just in the 2-3 month time when that food is in season. (Be careful about overestimating here.)

Please look at the example below. This person:
1) eats a medium serving of cantaloupe once a week, in season
2) has 1/2 a grapefruit about twice a month
3) has a small serving of sweet potatoes about three times a year
4) has a large hamburger or cheeseburger or meat loaf about four times a week
5) never eats winter squash.

	MEDIUM SERVING	YOUR SERVING	NUMBER OF TIMES:	PER:
		S M L	none 1 2 3 4 5 6 7	day week month year
Cantaloupe (in season)	1/4 medium	○ ■ ○	○ ■ ○ ○ ○ ○ ○ ○	○ ■ ○ ○
Grapefruit	(1/2)	○ ■ ○	○ ○ ■ ○ ○ ○ ○ ○	○ ○ ■ ○
Sweet Potatoes, Yams	1/2 cup	■ ○ ○	○ ○ ○ ■ ○ ○ ○ ○	○ ○ ○ ■
Hamburger, Cheeseburger, Meat Loaf	1 medium	○ ○ ■	○ ○ ○ ○ ■ ○ ○ ○	○ ■ ○ ○
Winter Squash,Baked Squash	1/2 cup	○ ○ ○	■ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○

Since the number of times is limited to 7, you may have to rethink your answer. For example, if you feel that you usually eat apples 8 times a month, it is the same as 2 times a week or 14 times a week is the same as 2 a day.
If you usually eat something MORE THAN 7 TIMES A DAY, please write in the food item on an available blank line at the bottom of the section and fill in a bubble for the number of times a DAY you eat the item.

If you have any questions about how to code your answer, please ask a test administrator.

FRUITS , VEGETABLES	MEDIUM SERVING	YOUR SERVING	NUMBER OF TIMES:	PER:
		S M L	none 1 2 3 4 5 6 7	day week month year
Apples, applesauce, pears	(1) or 1/2 cup			
Cantaloupe (in season)	1/4 medium			
Oranges	1 medium			
Orange juice or grapefruit juice	6oz. glass			
Grapefruit	(1/2)			
Other fruit juices, fortified fruit drinks	6oz. glass			
Beans such as, baked beans, pintos, kidney, limas or in Chili	3/4 cup			
Tomatoes, tomato juice	(1) or 6oz			
Broccoli	1/2 cup			
Spinach	1/2 cup			
Mustard greens, turnip greens, collards	1/2 cup			
Cole slaw, cabbage, sauerkraut	1/2 cup			
Carrots or mixed vegetables containing carrots	1/2 cup			
Green salad	1 med. bowl			
Salad dressing, mayonnaise (including on sandwiches)	2 Tablespoon			
French fries and fried potatoes	3/4 cup			
Sweet potatoes, yams	1/2 cup			
Other potatoes, incl. boiled, baked, potato salad, mashed	(1) or 1/2 cup			
Rice	3/4 cup			

FRUITS , VEGETABLES EATEN MORE THAN SEVEN TIMES A DAY	NUMBER OF TIMES PER DAY:
	S M L 8 9 10 11 12 13 14 15 16 17 18 19
1	
2	
3	
4	

PLEASE DO NOT WRITE IN THIS BOX

1 0 1 2 3 4 5 6 7 8 9

2 0 1 2 3 4 5 6 7 8 9

3 0 1 2 3 4 5 6 7 8 9

4 0 1 2 3 4 5 6 7 8 9

	MEDIUM SERVING	YOUR SERVING	NUMBER OF TIMES:	PER:
MEAT, LUNCH ITEMS		S M L	none 1 2 3 4 5 6 7	day week month year
Hamburgers, cheeseburgers, meat loaf	1 medium			
Beef - steaks, roasts	4oz			
Beef stew or pot pie with carrots, other vegetables	1 cup			
Liver, including chicken livers	4oz			
Pork, including chops, roasts	4oz (2 chops)			
Fried chicken	2sm/1lg piece			
Chicken or turkey, roasted, stewed or broiled	2sm/1lg piece			
Fried fish or fish sandwich	4oz or 1 sand			
Other fish, broiled, baked	4oz			
Spaghetti, lasagna, other pasta with tomato sauce	1 cup			
Hot dogs	2 dogs			
Ham, lunch meats	2 slices			
Vegetable soup, vegetable beef, minestrone, tomato soup	1 med. bowl			

MEAT, LUNCH ITEMS EATEN MORE THAN SEVEN TIMES A DAY	S M L	NUMBER OF TIMES PER DAY: 8 9 10 11 12 13 14 15 16 17 18 19
1_____		
2_____		

BREAKFAST FOODS		S M L	none 1 2 3 4 5 6 7	day week month year
High fiber, bran or granola cereals, shredded wheat	1 med. bowl			
Highly fortified cereals, such as Product 19, Total or Most	1 med. bowl			
Other cold cereals, such as Corn Flakes, Rice Krispies	1 med. bowl			
Cooked cereals	1 med. bowl			
Eggs (1 egg = small serv)	2 eggs			
Bacon	2 slices			
Sausage	2 patties/links			

BREAKFAST FOODS EATEN MORE THAN SEVEN TIMES A DAY	S M L	NUMBER OF TIMES PER DAY: 8 9 10 11 12 13 14 15 16 17 18 19
3_____		
4_____		

PLEASE DO NOT WRITE IN THIS BOX

1 0 1 2 3 4 5 6 7 8 9

2 0 1 2 3 4 5 6 7 8 9

3 0 1 2 3 4 5 6 7 8 9

4 0 1 2 3 4 5 6 7 8 9

	MEDIUM SERVING	YOUR SERVING	NUMBER OF TIMES:	PER:
BREADS, SALTY SNACKS, SPREADS		S M L	none 1 2 3 4 5 6 7	day week month year
White bread (including sandwiches), bagels, etc., crackers	2 slices, 3 crackers	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○
Dark bread, including whole wheat, rye, pumpernickel	2 slices	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○
Corn bread, corn muffins, corn tortillas	1 med. piece	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○
Salty snacks (chips, popcorn, etc.)	2 handfuls	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○
Peanuts, peanut butter	2 Tablespoon	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○
Magarine on bread or rolls	2 pats	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○
Butter on bread or rolls	2 pats	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○

BREADS, ETC. EATEN MORE THAN SEVEN TIMES A DAY	S M L	NUMBER OF TIMES PER DAY: 8 9 10 11 12 13 14 15 16 17 18 19
1	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○
2	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○
3	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○
4	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○

SWEETS		S M L	none 1 2 3 4 5 6 7	day week month year
Ice cream	1 scoop	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○
Doughnuts, cookies, cakes, pastry	1pc or 3 cook	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○
Pies	1 med. slice	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○
Chocolate candy	sm bar / 1oz	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○

SWEETS EATEN MORE THAN SEVEN TIMES A DAY	S M L	NUMBER OF TIMES PER DAY: 8 9 10 11 12 13 14 15 16 17 18 19
5	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○
6	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○

1 0 1 2 3 4 5 6 7 8 9

2 0 1 2 3 4 5 6 7 8 9

PLEASE DO NOT WRITE IN THIS BOX

3 0 1 2 3 4 5 6 7 8 9

4 0 1 2 3 4 5 6 7 8 9

5 0 1 2 3 4 5 6 7 8 9

6 0 1 2 3 4 5 6 7 8 9

	MEDIUM SERVING	YOUR SERVING	NUMBER OF TIMES:	PER:
DAIRY PRODUCTS, BEVERAGES		S M L	none 1 2 3 4 5 6 7	day week month year
Cheeses and cheese spreads, not including cottage cheese	2 slices or 2oz	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○
Whole milk and beverages with whole milk (not incl. on cereal)	8oz glass	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○
2% milk and beverages with 2% milk (not including on cereal)	8oz glass	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○
Skim milk, 1% milk or buttermilk (not including on cereal)	8oz glass	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○
Regular soft drinks (not diet)	12oz can	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○
Beer	12oz can	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○
Wine	1 med. glass	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○
Liquor	1 shot	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○
Milk or cream in coffee or tea	1 Tablespoon	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○
Sugar in coffee or tea, or on cereal	2 teaspoon	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○

DAIRY, BEVERAGES EATEN MORE THAN SEVEN TIMES A DAY	S M L	NUMBER OF TIMES PER DAY: 8 9 10 11 12 13 14 15 16 17 18 19
1_____	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○
2_____	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○
3_____	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○
4_____	○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○

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1 0 1 2 3 4 5 6 7 8 9

2 0 1 2 3 4 5 6 7 8 9

3 0 1 2 3 4 5 6 7 8 9

4 0 1 2 3 4 5 6 7 8 9

The following questions are about your USUAL eating habits.

7. How often do you eat the skin on chicken? ◯ Seldom/Never ◯ Sometimes ◯ Often/Always

How often do you eat the fat on meat? ◯ Seldom/Never ◯ Sometimes ◯ Often/Always

How often do you add salt to your food? ◯ Seldom/Never ◯ Sometimes ◯ Often/Always

How often do you add pepper to your food? ◯ Seldom/Never ◯ Sometimes ◯ Often/Always

8. Not counting salad or potatoes, about how many servings of vegetables do you eat per day or per week?

	none	1	2	3	4	5	6	7	8	9	per DAY	or	WEEK
VEGETABLES	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯		◯

9. Not counting juices, about how many pieces of fruit do you eat per day or per week?

	none	1	2	3	4	5	6	7	8	9	per DAY	or	WEEK
FRUITS	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯		◯

Please take a moment to fill in any questions you may have skipped. THANK YOU VERY MUCH for taking the time to fill out this information. The answers you have given will be very useful for interpreting the the results of this study. Your participation is sincerely appreciated!!!!

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