Kode/Nama Rumpun Ilmu	: 354/ Ilmu Gizi
Bidang Fokus	: Kualitas Kesehatan, Penyakit Tropis, Gizi dan Obat-obatan

PENELITIAN INTERNAL

Dietary Pattern And Anemia Among Indonesian Female Migrant Workers In Taiwan

Tim Pengusul :

Khairizka Citra Palupi, S.Gz. M.S	**NIDN : 0319128901**
Jung-Su Chang	**NIDN :**
Chun-Kuang Shih	**NIDN :**

Fakultas Ilmu-Ilmu Kesehatan / Program Studi Gizi

Universitas Esa Unggul

2019

HALAMAN PENGESAHAN PROPOSAL
PENELITIAN INTERNAL

Judul Penelitian		:	Dietary Pattern And Anemia Among Indonesian Female Migrant Workers In Taiwan
Kode/Nama Rumpun Ilmu		:	354
Peneliti			
a.	Nama Lengkap	:	Khairizka Citra Palupi, S.Gz., M.S
b.	NIDN	:	0319128901
c.	Jabatan Fungsional	:	Asisten Ahli
d.	Program Studi	:	Gizi
e.	Nomor HP	:	0812-1700-3917
f.	Alamat surel (*e-mail*)	:	khairizka.citra@esaunggul.ac.id
Biaya Luaran Tambahan		:	-
- Sumber dana lain (1)		:	-

Jakarta, 30 April 2019

Mengetahui,
Dekan Fakultas Ilmu Kesehatan

(Dr. Aprilita Rina Yanti Eff, M. Biomed, Apt)
NIP/NIK. 215020572

Ketua Peneliti,

(Khairizka Citra Palupi, S.Gz., M.S)
NIP/NIK. 0319128901

Menyetujui,
Ketua Lembaga Penelitian dan Pengabdian kepada Masyarakat
Universitas Esa Unggul

(Dr. Erry Yudhya Mulyani, S.Gz, M.Sc, RD)
NIK. 209100388

RINGKASAN PROPOSAL

Migration has been associated with increased vulnerability to anemia. However, effects of dietary acculturation on anemia among female migrant workers (FMWs) are not clear. The aim of this study was to investigate effects of dietary acculturation on anemia among Indonesia FMWs in Taiwan. In total, 235 Indonesian FMWs aged 20-50 years living in Taipei city were included. The hemoglobin (Hb) levels was measured using single fingerpick by HemoCue. Dietary patterns were identified using principal component (PCA) analysis from 28 food groups. The mean age was 32.51 ± 6.89 years and mean Hb level was 12.77 + 1.50 g/dL (non-anemia: 13.44 + 0.96 g/dL and anemia: 10.80 + 0.93 g/dL; p< 0.001). The prevalence of anemia was 25.53%. [SG1]Six dietary patterns were obtained by the PCA: coffee; healthy; modern; Indonesian, Taiwanese; meat and dairy. Taiwanese dietary pattern, characterized by high consumption of soy products, mushroom/seaweed, poultry, liver/organs, rice and soft/fizzy drink, protected against anemia: 1.000 (Ref), 0.485 (0.212 – 1.111), 0.360 (0.152 – 0.853), 0.273 (0.108 – 0.691), for quintile (Q) 1 Q1, Q2, Q3, and Q4 respectively (P for trend< 0.003). Our finding suggests that successful dietary acculturation to the host country may provide beneficial effects against anemia among FMWs.

BAB I
PENDAHULUAN

It has been estimated that 52.6 million domestic workers across the world and more than 80% of the migrant domestic workers are female (ILO, 2013). Migrant workers have been associated with increased vulnerability to anemia (Abrol et.al. 2008). Particularly, FMWs have a greater risk of developing anemia than do men (UNICEF, 2002). Abrol and colleagues investigated 564 FMWs in construction site in India and found that the prevalence of anemia among single females was 54.9% (Abrol et.al. 2008). According to the World Health Organization (WHO) guidelines, if the anemia prevalence rate is greater than 40%, it becomes a severe public health issue (WHO, 2008). This suggests that reproductive-aged female migrant workers may be at high risk for anemia and untreated anemia may reduce work productivity (Scholz et.al. 1997).

The health of migrant workers may be affected by conditions surrounding migration process (IOM, 2012) They may face acculturation which is a process to adopt the beliefs, habits and behaviors of their host country (Satia, 2010). Dietary acculturation is one aspects of the acculturation that explains an adoption process of dietary intake in the host country (Satia, 2010). Recent studies suggest that changing dietary pattern may contribute to diseases such as obesity, hypertension and mental diseases among immigrants in America and Europe (Popovic-Lipovac and Satia, 2013; Delavari et.al. 2013). To date, there is only one study reported the link between dietary pattern and anemia among Chinese migrant workers. Shi et al reported that “traditional (rice, vegetable, wheat flour)” and “sweet tooth (drinks, cake)” dietary pattern increase risk for anemia whilst “healthy (whole grains, fruits, vegetables)” dietary pattern as protective factor for anemia (Shi et.al. 2006). Currently, the effects of dietary acculturation on anemia among FMWs from different religious background are not clear. Indonesian FMWs represent the major sources of international domestic workers in Taiwan, which accounts for 56.61% (MOLT, 2015). We hypothesized that conditions surrounding migration process especially dietary acculturation in the host country may be associated with anemia. The broad aim of this study was to investigate (1) the prevalence of anemia and (2) effects of dietary acculturation on anemia among Indonesia FMWs living in Taiwan.

BAB II
METODE

2.1 Study Design and Subjects

This cross-sectional study was undertaken in Taipei and New Taipei City, Taiwan. A total of 235 Indonesian FMWs, aged 20-50 years old were recruited using convenience sampling in multi setting such as Taipei Medical University, public parks in Taipei, Indonesian migrant workers community event/meeting, mosques and Taipei Main Station from December 2015 – February 2015[SG2]. The response rate was 94%. Before initiating the data collection and biochemistry measurement, subjects were excluded if they had: (1) self-reported chronic diseases [e.g. cancer, type 2 diabetes, hypertension, and heart diseases), fever, pregnancy, breast feeding, consumed iron supplementation within previous 3 month, consumed anti-depressant drugs or anti-hypertensive drugs, having gastrointestinal disorders, severe bleeding and parasitic infections (e.g. inflammatory bowel disease, history of gastric ulcer, red blood cell disorders, menorrhagia, hemorrhoids, hematuria, uterine fibroids, malaria, and worm infection], (2) menopause, and (3) Taiwan resident visa. This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving human subjects were approved by Taipei Medical University Institutional Review Board (201409045). Written informed consent was obtained from all subjects

2.2 Data Collection and Biochemistry Measurement

Socio-demographic data such as age, income per month, length of work permits, family member they serve, type of jobs, and education level were obtained. Body weight was measured using digital weight scale from Mancorp Enterprises Ltd and recorded to the nearest 0.5 kg in light clothing, footwear removed and pockets emptied. Body height was determined by subject. Body Mass Index (BMI) was calculated as weight (kg)/height (m2). Overweight was defined as BMI between > 23 kg/m2 to 24.9 kg/m2 and obesity was defined as BMI > 25 kg/m2 (WHO, 2000). Physical distress (fatigue) was evaluated using Brief Fatigue Inventory (BFI) via oral interview. BFI has been identified as a valid and reliable uni-dimensional instrument to assess fatigue severity and the interference with life activities within previous 24 hours (Mendoza et.al, 1999). In the present sample, the Cronbach's alpha (0.89) met the standard criteria of acceptability. Mental distress (depressive symptoms) was also assessed using an Indonesian version of Beck Depression Inventory- II (BDI-II) (Beck et.al. 1996; Ginting et.al. 2013). BDI-II has been validated and is reliable for Indonesian

general population (Cronbach's alpha 0.90). BDI is one of the most widely used questionnaires to assess depressive symptoms and severity in general population (Aalto et.al. 2012; Smarr and Keefer, 2011)

Dietary data were assessed using modified Chinese version of Food Frequency Questionnaire (FFQ) for Taiwanese, which consists of 64 item questions (Lee et.al. 2006). The modification were: 1) foodstuffs from the same group were combined into one question; 2) food items that were unlikely to be consumed by Indonesian FMWs were deleted such as alcohol and pork; 3) food items that were likely to be consumed in high quantity in Indonesia were added into the FFQ such as chili, tempeh, coconut milk, coconut oil/palm oil, corn rice, and cassava (Papadaki and Scott, 2002). Eventually, the modified FFQ contained 31 questions relating to frequency of dairy products, eggs, red meat, poultry, fish, sea foods, liver/organs, soy products, light vegetables, red/orange vegetables, dark green vegetables, mushroom/seaweed, chili, fruits, rice, noodles, bread, potato/corn/sweet potato/cassava, peas and legumes, coffee, tea, soft drinks, creamer, sugar, ice cream/ chocolate, cake/biscuit/wafer, crisp, soy bean/sun flower/olive oil, coconut/palm oil, coconut milk, and margarine/butter. The FFQ was conducted via a face-to-face interview by investigator. The response will be filled at 8 categories: 1) never; 2) 0-3 times/month; 3) 1 time/week; 4) 2-4 times/week; 5) 5-6 times/week; 6) 1 time/day; 7) 2-3 times/day; 8) 4-5 times/day.

Erythropoiesis status was determined using HemoCue®201+ hemoglobin photometer from HemoCue AB. This instrument is generally recommended in public health surveys to determine the prevalence of anemia (Burger and Pierre-Louis, 2001). The HemoCue® system is based on the cyanmethemoglobin method and has been shown to be stable and durable in the field settings (WHO, 2011). According to the 2001 WHO report, anemia severity in reproductive aged women can be defined based on Hb levels: (1) Hb level ≥ 12 g/dL for non-anemia,

(2) Hb level between 11-11.9 g/dL for mild anemia, (3) Hb level between 8-10.9 g/dL for moderate anemia and

(4) Hb level< 8 g/dL for severe anemia (WHO, 2011).

2.3 Statistical Analysis

Statistical Analysis was performed using IBM SPSS 20.0 version. Categorical data were presented as number and percentage, and tested by chi-square test. Continuous data were presented as mean (standard deviation) and tested by 2 sample t-test. Differences between two independent samples were analyzed by the Man-Whitney U-test [SG3]for the non-parametric data. The trend test was conducted using a general linear model for continuous data. Logistic regression models were used to estimate the odds ratio (OR) of dependent variable and independent effects of known risk factor at 95% confidence interval (CI). To further characterize the relationships between risk factors in relation to anemia, a binary logistic model was employed. Dietary patterns were identified using principal component analysis (PCA) (Hu, 2002). From thirty-one items, three items (tea, noodles/instant noodles, coconut oil/palm oil) were excluded because the anti-image value was below 0.5 (Yong, 2013). Six factors were identified based on having an eigenvalue > 1.35, the shape of scree plot and a meaningful dietary pattern (Yong, 2013; Field, 2000). Food with a factor loading between – 0.30 and 0.30 were not retained (Yong, 2013; Field, 2000). Labeling of dietary patterns was based on the interpretation of foods with high factor loadings for each dietary pattern. Dietary factor scores were obtained as the sum of the standardized weekly intake of each food associated with that pattern (DiStefano et.al. 2009). P-value less than 0.05 were set as statistically significant.

BAB III
HASIL

3.1 Baseline Characteristics

A total of 235 FMWs were entered the analysis and 99.6 % (n=234 people) of the study participants were Muslim. The mean age of study participants was 32.51 + 6.89 years. The mean BMI was 23.53+ 3.20 kg/m2. 22.1% (n=52) women were overweight and 29% (n=68) were obesity. 74.9 % Indonesia FMWs who reported consumed Taiwanese foods compared to Indonesia/western foods (25.1%) (p<0.01). Table 1 shows the characteristics of study subjects in relation to anemia. The prevalence of anemia was 25.53 %. The mean Hb level was 12.77+ 1.50 g/dL (non-anemia: 13.44+ 0.96 g/dL and anemia: 10.80+ 0.93 g/dL; p<0.001). No significant differences were found on religion, demographic and health factors, except family member they serve. Anemia women were more likely to have higher family member they serve, suggesting a higher job burden (p=0.044).

Table 1. Characteristic of the study participants according to anemia status (n=235)

Variables†	Non-anemia	Anemia	*p*- values*
Number (n,%)	175 (74.46 %)	60 (25.53 %)	
Demographic factors			
Age (years)	32.46 (6.66)	32.63 (7.59)	0.881
Income (Taiwanese dollars)	15981.07 (2520.61)	15924.00 (2858.75)	0.351
Religion (n,%)			
Islam	174 (99.4)	60 (100.0)	
Non-Islam	1 (0.57)	0 (0.0)	
Length of work permits (months)	50.59 (30.76)	56.78 (33.81)	0.244
Family member they serve (n)	3 (1-4)	3 (2-5)	0.044
Type of job			1.000
Caregiver	164 (93.7)	57 (95.0)	
Non-caregiver	11 (6.3)	3 (5.0)	
Education level			0.421
Elementary school	23 (13.1)	6 (10.0)	
Junior high school	85 (48.6)	34 (56.7)	
≥Senior high school	67 (38.3)	20 (33.3)	
Health status			
BMI (kg/m²)	23.53 (3.31)	23.52 (2.89)	0.551
Fatigue score	0.96 (1.58)	1.10 (1.64)	0.830
Depressive symptoms score	9.55 (8.47)	10.10 (7.42)	0.373
Hemoglobin (µg/dL)	13.44 (0.96)	10.80 (0.93)	< 0.001

† Categorical data presented as number (%); continuous data presented as means (standard deviation or median)

**p*-values are based on chi-square test for categorical variables, Mann-Whitney U-test for continuous variables

Characteristics of the Study Participant in Relation to Dietary Patterns

We next investigated patterns of food intake among Indonesia FMWs. Table 2 show the six dietary patterns were obtained by the PCA: coffee (Factor 1), healthy (Factor 2), modern (Factor 3), Indonesian (Factor 4), Taiwanese (Factor 5) and meat and dairy (Factor 6). Thresholds for factor loadings are above 0.3 or below - 0.3. The six factors of dietary pattern explained 42.04 % of the variance in intake (10.3 %, 8.99 %, 6.63 %, 6.13 %, 5.18 %, and 4.83 % for factor 1 to 6, respectively). Table 3 shows women with the higher 'coffee (Factor 1)' score (Q4) were older (30.71 versus 35.24 years) and the length of the work permit were longer (45.25 versus 61.05 months) compared with Q1 (all $p<0.05$). By contrast, women with the highest score (Q4) of 'Taiwanese dietary pattern (Factor 5)' had the shorter length of the work permit (46.75 versus 58.92 months) but had the lower anemia prevalence rate (16.9% versus 39.3%) compared with Q1 (all $p<0.05$) (Table 3).

Table 2. Factor loading† for six dietary pattern among Indonesian female migrant workers in Taiwan

Factor 1 (Coffee)		Factor 2 (Healthy)		Factor 3 (Modern)		Factor 4 (Indonesian)		Factor 5 (Taiwanese)		Factor 6 (Meat and Dairy)	
Creamer	0.940	Red orange vegetables	0.593	Bread	0.554	Crisp	0.654	Soy products	0.654	Red meat	0.718
Coffee	0.938	Seafood	0.573	Margarine/butter	0.475	Coconut milk	0.615	Mushroom/ seaweed	0.581	Corn/potato/ sweet potato/cassava	0.558
Sugar	0.892	Peas and legumes	0.454	Ice cream/chocolate	0.443	Fresh Chili	0.571	Poultry	0.511	Dairy products	0.551
		Fish	0.430	Soft/fizzy drinks	0.345	Cake/biscuit/wafer	0.403	Soft/fizzy drinks	0.376		
		Light vegetables	0.429	Soy bean/sun flower/ olive oil	-0.448	Soft/fizzy drinks	0.318	Liver/organs	0.366		
		Fruits	0.425	Rice	-0.501	Mushroom/ seaweed	-0.361	Rice	0.331		
		Cake/biscuit/wafer	0.357	Dark green vegetables	-0.549						
		Eggs	0.322								

† Factor loading is equivalent to simple correlation between the food items and the factor. Food groups with factor loading between having factor loadings between -0.30 and 0.30 are not shown for simplicity

Table 3. Characteristics of the study participants with dietary pattern scores in the lowest (quintile 1) and in the highest (quintile 4) for the six dietary patterns

Variables	Factor1 (Coffee)		Factor 2 (Healthy)		Fcator3 (Modern)		Factor 4 (Indonesian)		Fcator 5 (Taiwanese)		Factor 6 (Meat /Dairy)	
	Q1	Q4	Q1	Q4	Q1	Q4	Q1	Q4	Q1	Q4	Q1	Q4
Socio-economic and demographic factors												
Age (yrs)	30.7 (6.4)	35.2 (7.0)*	32.71 (6.2)	33.92 (6.5)	32.15 (7.1)	31.75 (6.6)	33.90 (6.8)	32.26 (7.2)	32.30 (6.6)	32.92 (7.6)	31.98 (6.9)	32.90 (6.5)
Income (Taiwanese dollars)	16041.0 (2237.9)	15921.9 (3429.9)	15739.7 (2824.9\)	16477.7 (1684.7)	15828.8 (2884.9)	15953.9 (2161.0)	15806.5 (2838.8)	15907.9 (2035.8)	16206.3 (1821.5)	15551.8 (3111.6)	15845.7 (2947.9)	15834.7 (2921.0)
Length of work permits (months)	45.3 (26.5)	61.1 (36.4)*	48.3 (34.2)	56.1 (31.4)	54.7 (31.7)	51.8 (29.6)	44.9 (32.4)	54.3 (28.8)	58.9 (32.6)	46.8 (32.1)*	42.9 (28.6)	55.1 (30.3)*
Family member they serve	3 (1,5)	3 (2,4)	3 (1,4)	3 (1.25, 5)	3 (1,5)	3 (2,4)	2 (1,4)	3 (1.5,4)	3 (1,5)	3 (2,5)	3 (1,5)	3 (1,4)
Type of job												
Caregiver	52 (94.5)	38 (92.7)	56 (94.9)	57 (95.0)	57 (96.6)	55 (93.2)	55 (93.2)	58 (95.1)	58 (95.1)	57 (96.6)	56 (94.9)	56 (90.3)
Non-caregiver	3 (5.5)	3 (7.3)	3 (5.1)	3 (5.0)	2 (3.4)	4 (6.8)	4 (6.8)	3 (4.9)	3 (4.9)	2 (3.4)	3 (5.1)	6 (9.7)
Education level												
Elementary school	4 (7.3)	4 (9.8)	14 (23.7)	2 (3.3)*	11 (18.6)	6 (10.2)	10 (16.9)	7 (11.5)*	6 (9.8)	9 (15.3)	11 (18.6)	5 (8.1)
Junior high school	29 (52.7)	26 (63.4)	26 (44.1)	32 (53.3)	25 (42.4)	33 (55.9)	36 (61.0)	27 (44.3)	38 (62.3)	29 (49.2)	31 (52.5)	30 (48.4)
≥ Senior high school	22 (40.0)	11 (26.8)	19 (32.2)	26 (43.3)	23 (38.0)	20 (33.9)	13 (22.0)	27 (44.3)	17 (27.8)	21 (34.6)	17 (28.8)	27 (43.5)
Health status												
BMI	23.6 (3.2)	24.4 (3.7)	23.9 (3.4)	23.4 (3.16)	23.5 (3.7)	23.7 (2.6)	23.7 (2.9)	22.9 (2.8)	23.3 (2.5)	23.9 (3.6)	24.5 (3.2)	22.7 (2.7)*
Fatigue score	1.2 (1.9)	0.7 (1.2)	0.7 (1.3)	0.9 (1.8)	1.1 (1.6)	0.8 (1.3)	1.1 (1.7)	0.8 (1.3)	0.8 (1.3)	0.9 (1.7)	0.9 (1.5)	1.2 (1.6)
Depressive symptoms score	8.7 (8.1)	9.7 (7.1)	9.6 (9.4)	8.6 (7.3)	9.2 (7.6)	9.4 (7.9)	10.28 (9.5)	9.0 (7.1)	8.9 (8.6)	10.3 (9.3)	8.9 (8.9)	10.0 (8.3)
Hemoglobin (μg/dL)	12.9 (1.4)	12.7 (1.7)	12.5 (1.5)	12.8 (1.5)	12.8 (1.6)	12.7 (1.4)	12.9 (1.6)	12.7 (12.5)	12.4 (1.6)	13.0 (1.5)*	12.7 (1.8)	12.8 (1.45)
Erythropoiesis												
Non-anemia	46 (83.6)	29 (70..7)	42 (71.2)	43 (71.7)	44 (74.6)	44 (74.6)	14 (23.7)	16 (26.2)	37 (60.7)	49 (83.1)*	16 (27.1)	15 (24.2)
Anemia	9 (16.4)	12 (29.3)	17 (28.8)	17 (28.3)	15 (25.4)	15 (25.4)	45 (76.3)	45 (73.8)	24 (39.3)	10 (16.9)	43 (72.9)	47 (75.8)

† Categorical data presented as number (%); continuous data presented as means (standard deviation or median)

**p*-values are based on chi-square test for categorical variables, mann-whitney u-test for continuous variables

Association between Dietary Patterns and Anemia

Univariate logistic regression analysis showed that "Taiwanese dietary pattern (Factor 5)" has 48.6%, 60.6% and 68.5% lower risk for anemia for Q2, Q3 and Q4 (p-value=0.1, 0.025, 0.008, respectively) compared with those with the lowest (Q1) (p for trend=0.004, Univariate, Table 4). Adjusted OR (95% CI) for anemia for the second, third and fourth quartiles versus the lowest quartile (Q1) of the "Taiwanese dietary pattern (Factor 5)" were 0.485 (0.212 - 1.111), 0.360 (0.152 - 0.853), and 0.273 (0.108 - 0.691), respectively after adjusting for age, family member they serve, length of work permits, and education level (p for trend=0.003, Multivariate, Table 4). The corresponding values for the "coffee dietary pattern (Factor 1)" were 1.517 (0.582 - 3.956), 2.848 (1.156-7.013) and 2.696 (0.959 - 7.584), respectively (p for trend=0.076; multivariate, Table 4). A weak protection effects was seen in "healthy dietary pattern (Factor 2)" with the corresponding values of 1.252 (0.545 - 2.878), 0.379 (0.143 - 1.004) and 1.378 (0.575 - 3.305), respectively (p for trend=0.886). No significant effects were observed on Indonesia (Factor 4), Modern (Factor 3) and Meat/dairy dietary patterns (Factor 6).

Table 4. Logistic regression model for associations between dietary patterns and anemia

Variables	Univariate		Multivariate†	
	OR* (95% CI)	*p*-value	OR* (95% CI)	*p*-value
Factor 1 (Coffee)				
Q1	Ref		Ref	
Q2	1.376 (0.545- 3.476)	0.500	1.517 (0.582 - 3.956)	0.394
Q3	2.662 (1.124 - 6.307)	0.026	2.848 (1.156 - 7.013)	0.023
Q4	2.115 (0.793 - 5.642)	0.135	2.696 (0.959 - 7.584)	0.060
p-trend*	0.064		0.076	
Factor 2 (Healthy)				
Q1	Ref		Ref	
Q2	1.112 (0.504 - 2.454)	0.793	1.252 (0.545 - 2.878)	0.597
Q3	0.395 (0.155 - 1.007)	0.052	0.379 (0.143 - 1.004)	0.051
Q4	0.977 (0.441 - 2.164)	0.954	1.378 (0.575 - 3.305)	0.473
p-trend	0.460		0.886	
Factor 5 (Taiwanese)				
Q1	Ref		Ref	
Q2	0.514 (0.232 - 1.136)	0.100	0.485 (0.212 - 1.111)	0.087
Q3	0.394 (0.174 - 0.890)	0.025	0.360 (0.152 - 0.853)	0.020
Q4	0.315 (0.134 - 0.738)	0.008	0.273 (0.108 - 0.691)	0.006
p-trend	0.004		0.003	
Factor 4 (Indonesian)				
Q1	Ref			
Q2	0.871 (0.369 - 2.052)	0.751		
Q3	1.477 (0.644 - 3.388)	0.357		
Q4	1.143 (0.499 - 2.615)	0.752		
p-trend	0.487			
Factor 3 (Modern)				
Q1	Ref			
Q2	1.160 (0.515 - 2.611)	0.721		
Q3	0.867 (0.370 - 2.032)	0.742		
Q4	1.000 (0.437 - 2.290)	1.000		
p-trend	0.829			
Factor 6 (Meat and dairy)				
Q1	Ref			
Q2	0.538 (0.221 - 1.308)	0.171		
Q3	1.459 (0.655 - 3.250)	0.355		
Q4	0.858 (0.379 - 1.941)	0.713		
p-trend	0.698			

† Multivariate model: adjusted for age, family member they serve, length of work permits, education and dietary pattern

* *p*-trend: the trend test was conducted using a general linear model for continuous variable

BAB IV
PEMBAHASAN

To our knowledge, this is the first study investigating effects of dietary acculturation on anemia among Muslim FMWs living in Taiwan. Currently, Indonesian FMWs represent the major sources of foreign domestic workers in Taiwan (MoLT, 2015). Dietary acculturation may lead to the change of food choice which may result in (a) maintenance of traditional eating patterns, (b) adoption of host country eating patterns, or (c) bicultural eating patterns (Satia, 2010). Our study showed that 74.9 % Indonesia FMWs consumed Taiwanese foods and not Indonesia, suggesting that FMWs adopt well in Taiwan. Dietary acculturation for Muslim FMWs can vary considerably depending on a range of conditions such as food taste, foods that are forbidden to eat by Muslim (e.g. pork, un-halal meat) and the host environment. Because domestic workers tend to live with their host families, hence the support from the host families is pivotal for dietary acculturation. Of the six dietary patterns investigated, the "Taiwanese dietary pattern", characterized by frequent consumption of soy products, mushroom/ seaweed, poultry, liver and organs, rice, and soft/fizzy drink, protect Indonesia Muslim FMWs against anemia. By contrast, "coffee dietary pattern" was associated with an increased risk for anemia. Our study suggests that a successful dietary acculturation to the host country may provide beneficial effects against anemia among FMWs with different religious belief.

The overall prevalence of anemia among Indonesia FMWs was 25.5 %, which is slightly higher compared with reproductive-aged women in Taiwan (20%) (Pan et.al. 2011) and Western Asia-Pacific Region (21.5%) (WHO, 2008). However, this rate is much lower when compared with Indonesian reproductive-aged women (33.1%) (WHO, 2008), female migrant worker in India (54.9%) (Abrol et.al. 2008) and South East Asia (45.7%) (WHO, 2008). The lower prevalence rate may be due to a successful dietary acculturation and the improvement of nutritional status. Our study found that 51.5% Indonesia FMWs reported weight gain since they work in Taiwan. Literatures suggest that migration in high income countries may lead to overweight and obesity (Delavari et.al. 2013). Studies suggest that overweight may serve as protective factor against the development of anemia27. Although the anemia rate is comparable to Taiwanese women (Pan et.al. 2011), reproductive-aged FMWs remain at high risk for anemia.

In our study, "Taiwanese dietary pattern (Factor 5)" seems to play a key role in the prevention of anemia. A typical Taiwanese diet consists of high intake of liver and organs which contains high amount of vitamin B12, folate and iron that are necessary for the

erythropoiesis (Koury and Ponka, 2004). Liver and organs are good sources for heme-iron (Milman, 2011; Stabler and Allen, 2004), hence provide a better iron bioavailability than non-heme iron. Poultry can enhance non-heme iron absorption rate (Hurrel et.al. 2006). Foods such as soy products, mushroom and seaweed are key elements of Taiwanese diet which were also negatively associated with Metabolic Syndrome (Yeh et.al. 2011). Soy products such as fermented tofu and tempeh are vitamin B-12 rich food after lactic fermentation (Watanabe et.al. 2013a). Seaweed (Watanabe et.al, 2013b) and mushroom (Watanabe et.al. 2013a; Watanabe et.al, 2013b) contain relatively high vitamin B-12 compared with other plant-based foods. Rice, particularly non-refined rice, can provide non-heme iron and vitamin B complex (Garcia-Casal et.al, 1998). Although soft/fizzy drink was detected in "Taiwanese dietary pattern", they also detected in "Modern (Factor 3) and Indonesian (Factor 4) dietary pattern" which may suggest that these items were largely involved on principal factor. Soft/fizzy drink is carbonated beverage which may contain caffeine and inhibit iron absorption. However, the caffeine content is much lower compared with coffee (Nawrot et.al. 2003). We also confirm that coffee (Factor 1) is associated with an increased risk for anemia. It has been widely acknowledged that caffeine inhibits the absorption of non-heme iron (Milman, 2011; Munoz et.al. 1988). Early study in rats showed that coffee may interfere the mobilization of Fe from the liver to sites of hematopoiesis (Munoz et.al. 1986)

Our preliminary result showed an interactive relationship among "Taiwanese dietary pattern (Factor 5)", "Healthy dietary pattern (Factor 2)" and "Modern dietary pattern (Factor 3)". We found a significant positive trend between "Taiwanese dietary pattern" and "Healthy dietary" ($p<0.0001$) (data not shown). By contrast, an inverse relationship between "Taiwanese dietary pattern" and "Modern dietary pattern" was found ($p<0.0001$) (data not shown). This finding indicates that 'Taiwanese', 'Modern' and 'Healthy' dietary patterns were mixed and interacted, but effects of this interaction are currently not clear. "Modern dietary pattern" was characterized by high consumption of bread, margarine/butter, ice cream/chocolate, and soft/fizzy drink, and low consumption of dark green vegetables, rice and soy bean/sun flower/ olive oil which indicate "Westernized dietary pattern" (Nanri et.al. 2010; Suzuki et.al.2013). By contrast, "Healthy dietary pattern" indicated a "balanced diet" with high consumption of red orange vegetables, seafood, peas and legumes, fish, light vegetables, fruits, cake biscuit and wafer and eggs (Nanri et.al. 2010; Suzuki et.al.2013). Red orange vegetables, peas and legumes, light vegetables and fruit contain not only non-heme iron but also vitamins A, B complex, C and folate. Vitamin C can enhance non-heme iron absorption rate (IoMSC, 1998).

Fish and seafood are good sources for heme iron and vitamin B-12 (Stabler and Allen 2004; Hurrell et.al. 2006). A negative association between “Taiwanese diet” and “Modern diet” also indicates that FMWs who follow “Taiwanese diet” consume less convenient foods such as bread, margarine and butter, ice cream and chocolate. High energy density food is known to be a risk factor for anemia (Chang et.al. 2014)

There are several limitations in our study. For example, the cross-sectional nature of the current study and small sample size are one of the limitations. Our study did not assess the type of anemia, and thus, we cannot differentiate the type of anemia. The lack of serum iron and ferritin data also makes it impossible to distinguish the type of anemia. The strength of our study includes the use of dietary pattern analysis, which may overcome some limitations inherited in absolute nutrient intakes. People do not eat single nutrients but consume a set of meals, which contain multiple nutrients and food components that may affect nutrition absorption. In addition, we excluded subjects who had self-reported anemia. Authors should discuss the results and how they can be interpreted in perspective of previous studies and of the working hypotheses. The findings and their implications should be discussed in the broadest context possible. Future research directions may also be highlighted. In conclusion, our finding suggests that successful dietary acculturation to the host country may provide beneficial effects against anemia among FMWs with different religious belief.

BAB V
KESIMPULAN

Successful dietary acculturation to the host country may provide beneficial effects against anemia among FMWs.

BAB VI
BIAYA PENELITIAN

Biaya Penelitian

Rekapitulasi Biaya

No	Jenis Pengeluaran	Biaya Pengeluaran
1	Honorarium	10.000.000,00
2	Perjalanan	4.000.000,00
3	Pembelian bahan habis pakai	7.000.000,00
4	Sewa Alat dan Laboratorium	5.000.000,00
5	Publikasi	1.000.000,00
	Total	Rp. 27.000.000,00

DAFTAR PUSTAKA

Aalto, A.M., Elovainio, M., Kivimaki, M., Uutela, A., and Pirkola, S, 2012, The Beck Depression Inventory and General Health Questionnaire as measures of depression in the general population: a validation study using the Composite International Diagnostic Interview as the gold standard. Psychiatry Res, 197 (1-2), 163-171.

Abrol, A., Kalia, M., Gupta, B., and Sekhon, A., 2008, Maternal health indicators among migrant women construction workers. Indian J Community Med. 33(4), 276-277.

Beck, A.T., Steer, R.A., Ball, R., and Ranieri, W., 1996, Comparison of Beck Depression Inventories -IA and -II in psychiatric outpatients. J Pers Assess, 67(3), 588-597.

Helen Keler International, Helen Keler WORLDWIDE, How to assess iron deficiency anemia and use the hemocue, Date of access: 03/07/2019. https://www.researchgate.net/publication/267378422_

HOW_TO_ASSESS_IRON_DEFICIENCY_ANEMIA_AND_USE_THE_HEMOCUE

INTERNATIONAL ORGANIZATION FOR MIGRATION (IOM), Asian Labor Migrant and Health: Exploring Policy Routes Issue in Brief, Date of access: 03/07/2019. https://www.migrationpolicy.org/research/asian-labor-migrants-health

Chang, J.S., Chen, Y.C., Owaga, E., Palupi, K.C., Pan, W.H., and Bai, C.H., 2014, Interactive effects of dietary fat/carbohydrate ratio and body mass index on iron deficiency anemia among Taiwanese women. Nutrients, 6(9),3929-3941.

Delavari, M., Sønderlund, A.L., Swinburn, B., Mellor, D., and Renzaho, A., 2013, Acculturation and obesity among migrant populations in high income countries – a systematic review. BMC Public Health, 13(1), 458-58.

DiStefano, C., Zhu, M. and Mindrila, D., 2009, Understanding and using factor scores: Considerations for the applied researcher. Practical assessment, research & evaluation, 14(20), 1-11.

Field, A., 2000. Discovering statistics using spss for windows. (USA: Sage Publications Inc).

Garcia-Casal, M.N., Layrisse, M., Solano, L., Baron, M.A., Arguello, F., Llovera, D., Ramirez, J., Leets, I., and Tropper, E., 1998. Vitamin A and beta-carotene can improve nonheme iron absorption from rice, wheat and corn by humans. J Nutr, 128(3), 646-650.

Ginting, H., Näring, G., van der Veld, W.M., Srisayekti, W., and Becker, E.S., 2013, Validating the Beck Depression Inventory-II in Indonesia's general population and coronary heart disease patients. International Journal of Clinical and Health Psychology, 13(3), 235-242.

Hu, F.B., 2002, Dietary pattern analysis: a new direction in nutritional epidemiology. Curr Opin Lipidol, 13(1), 3-9.

Hurrell, R.F., Reddy, M.B., Juillerat, M., and Cook, J.D., 2006, Meat protein fractions enhance nonheme iron absorption in humans. J Nutr, 136(11), 2808-2812.

International Labour Organization, Domestic workers across the world: Global and regional statistics and the extent of legal protection, Date of access: 04/07/2017. http://www.ilo.org/travail/ Whatsnew/WCMS_173363/lang--en/index.htm.

Institute of Medicine (US) Standing Committee on the Scientific Evaluation of Dietary Reference Intakes, 1998. Dietary reference intakes for thiamin, riboflavin, niacin, vitamin B6, folate, vitamin B12, pantothenic acid, biotin, and choline. (US : National Academies Press).

Kordas, K., Fonseca Centeno, Z.Y., Pachon, H., and Jimenez Soto, A.Z., 2013, Being overweight or obese is associated with lower prevalence of anemia among Colombian women of reproductive age. The Journal of Nutrition, 143(2), 175-181.

Koury, M.J. and Ponka, P., 2004, New insights into erythropoiesis: the roles of folate, vitamin B12, and iron. Annu Rev Nutr, 24, 105-131.

Lee, M.S., Pan, W.H., Kai-Li, L., and Mei-Shu, Y., 2006, Reproducibility and validity of a Chinese food frequency questionnaire used in Taiwan. Asia Pac J Clin Nutr, 15(2), 161-169.

Mendoza, T.R., Wang, X.S., Cleeland, C.S., Morrissey, M., Johnson, B.A., Wendt, J.K., and Huber, S.L., 1999, The rapid assessment of fatigue severity in cancer patients: use of the Brief Fatigue Inventory. Cancer, 85(5), 1186-1196.

MINISTRY OF LABOUR TAIWAN, 2018, Foreign workers in Productive Industries and Social Welfare 2018.

Milman, N., 2011, Anemia--still a major health problem in many parts of the world. Ann Hematol, 90(4), 369-377.

Munoz, L.M., Lonnerdal, B., Keen, C.L., and Dewey, K.G., 1988, Coffee consumption as a factor in iron deficiency anemia among pregnant women and their infants in Costa Rica. Am J Clin Nutr, 48(3), 645-651.

Munoz, L., Keen, C.L., Lonnerdal, B., and Dewey, K.G., 1986, Coffee intake during pregnancy and lactation in rats: maternal and pup hematological parameters and liver iron, zinc and copper concentration. The Journal of Nutrition, 116(7), 1326-1333.

Nanri, A., Kimura, Y., Matsushita, Y., Ohta, M., Sato, M., Mishima, N., Sasaki, S., and Mizoue, T., 2010, Dietary patterns and depressive symptoms among Japanese men and women. Eur J Clin Nutr, 64(8), 832-839.

Nawrot, P., Jordan, S., Eastwood, J., Rotstein, J., Hugenholtz, A., Feeley, M., 2003, Effects of caffeine on human health. Food Addit Contam, 20(1), 1-30.

Papadaki, A. and Scott, J.A., 2002, The impact on eating habits of temporary translocation from a Mediterranean to a Northern European environment. Eur J Clin Nutr, 56(5), 455-461.

Pan, W.H., Wu, H.J., Yeh, C.J., Chuang, S.Y., Chang, H.Y., Yeh, N.H., and Hsieh, Y.T., 2011, Diet and health trends in Taiwan: comparison of two nutrition and health surveys from 1993-1996 and 2005-2008. Asia Pac J Clin Nutr, 20(2), 238-250.

Popovic-Lipovac, A. and Strasser, B., 2013, A Review on Changes in Food Habits Among Immigrant Women and Implications for Health. J Immigr Minor Health, 17(2), 582-590.

Satia, J.A., 2010, Dietary acculturation and the nutrition transition: an overview. Appl Physiol Nutr Metab, 35(2), 219-223.

Scholz, B.D., Gross, R., Schultink, W., and Sastroamidjojo, S., 1997, Anaemia is associated with reduced productivity of women workers even in less-physically-strenuous tasks. British Journal of Nutrition, 77(1), 47-57.

Shi, Z., Hu, X., Yuan, B., Pan, X., Dai, Y., and Holmboe-Ottesen, G., 2006, Association between dietary patterns and anaemia in adults from Jiangsu Province in Eastern China. British Journal of Nutrition, 96(5), 906-912.

Smarr, K.L. and Keefer, A.L., 2011, Measures of depression and depressive symptoms: Beck Depression Inventory-II (BDI-II), Center for Epidemiologic Studies Depression Scale (CES-D), Geriatric Depression Scale (GDS), Hospital Anxiety and Depression Scale (HADS), and Patient Health Questionnaire-9 (PHQ-9). Arthritis care & research, 63(S11), S454-S466.

Stabler, S.P. and Allen, R,H., 2004, Vitamin B12 deficiency as a worldwide problem. Annu Rev Nutr, 24, 299-326.

Suzuki, T., Miyaki, K., Tsutsumi, A., Hashimoto, H., Kawakami, N., and Takahashi, M., 2013, Japanese dietary pattern consistently relates to low depressive symptoms and it is modified by job strain and worksite supports. J Affect Disord, 150(2), 490-8.

UNICEF, Prevention and control of nutritional anemia: A south asia priority, Date of access: 03/05/2018.https://hetv.org/pdf/anemia-pc.pdf.

Watanabe, F., Yabuta, Y., Tanioka, Y., and Bito, T., 2013, Biologically active vitamin b12 compounds in foods for preventing deficiency among vegetarians and elderly subjects. J Agric Food Chem, 61(28), 6769-6775.

WORLD HEALTH ORGANIZATIONS, Worldwide prevalence of anemia 1993 – 2005, Date of access: 02/07/2017.http://www.who.int/nutrition/publications/micronutrients/anemia _iron_deficiency /9789241596657/en/. Accessed 14 May 2015.

WORLD HEALTH ORGANIZATION, Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity, Date of access: 03/07/2018, https://www.who.int/vmnis/ indicators/haemoglobin/en/

WORLD HEALTH ORGANIZATION, International Association for the study of obesity, Organization,

Redefining Obesity and Its Treatment, Date of access: 03/07/2018, http://www.wpro.who.int/nutrition/documents/docs/Redefiningobesity.pdf

Yeh, C.J., Chang, H.Y., and Pan, W.H., 2011, Time trend of obesity, the metabolic syndrome and related dietary pattern in Taiwan: from NAHSIT 1993-1996 to NAHSIT 2005-2008. Asia Pac J Clin Nutr, 20(2), 292-300.

Yong, A.G., Pearce, S., 2013, A beginner's Guide to Factor Analysis: Focusing on Exploratory Factor Analysis.Tutorials in Quantitative Methods for Psychology, 9(2), 79-94.

SURAT PERNYATAAN

Yang bertandatangan di bawah ini :

Nama	:	**Khairizka Citra Palupi S.Gz. M.S**
Status	:	Dosen
Jabatan Struktural	:	Dosen Tetap Fakultas Ilmu Kesehatan
Fakultas/Prodi	:	Prodi Ilmu Gizi

Dengan ini menyatakan bahwa :

1. Saya memahami bahwa saya akan diberikan Insentif Penelitian sebesar Rp. 27.000.000,- (Dua Puluh Tujuh Juta Rupiah), dengan menyerahkan proposal ke LPPM paling lambat tanggal 30 April 2019
2. Saya memahami bahwa dengan diberikannya Insentif Penelitian tesebut saya berkewajiban untuk melakukan penelitian, membuat laporan hasil penelitian dan mempublikasikan ke dalam jurnal ilmiah, minimal 1 penelitian per tahun.
3. Saya memahami bahwa Insentif Penelitian akan saya terima untuk penelitian yang saya lakukan sebagai peneliti utama apabila penelitian tersebut merupakan penelitian bersama.
4. Saya memahami bahwa untuk tahun 2019 hasil penelitian harus diserahkan paling lambat sebelum tanggal 1 Juni 2020 dan dipublikasikan sebelum tanggal 1 Desember 2019.
5. Saya memahami bahwa apabila saya tidak dapat memenuhi kewajiban tersebut, maka Insentif Penelitian tidak diberikan kepada saya lagi sampai dengan saya memenuhi kewajiban untuk melakukan, membuat laporan dan mempublikasikan penelitian tersebut.

Demikian surat pernyataan ini saya buat dengan sebenar-benarnya untuk digunakan sebagaimana mestinya.

Jakarta, 30 April 2019
Yang membuat pernyataan,

Khairizka Citra Palupi, S.Gz. M.S

K W I T A N S I

Sudahterimadari : **LPPM UNIVERSITAS ESA UNGGUL**

Uangsebesar (denganhuruf) : *DUA PULUH TUJUH JUTA RUPIAH*

Untukpembayaran : **Penelitian Tahun 2019**

Rp. 27.000.000,-

SETUJU DIBAYAR
Ketua LPPM UEU

Dr. Erry Yudhya Mulyani, S.Gz, M.Sc

Jakarta, 1 Desember 2019
Yang menerima,

Khairizka Citra Palupi, S.Gz. M.S

K W I T A N S I

Sudahterimadari : **LPPM UNIVERSITAS ESA UNGGUL**

Uangsebesar (denganhuruf) : *DUA PULUH TUJUH JUTA RUPIAH*

Untukpembayaran : **Penelitian Tahun 2019**

Rp. 27.000.000,-

SETUJU DIBAYAR
Ketua LPPM UEU

Dr. Erry Yudhya Mulyani, S.Gz, M.Sc

Jakarta, 1 Desember 2019
Yang menerima,

Khairizka Citra Palupi, S.Gz. M.S