



UNIVERSITI PUTRA MALAYSIA

***DEVELOPMENT AND VALIDATION OF FOOD FREQUENCY
QUESTIONNAIRE FOR URBAN HEMODIALYSIS POPULATION IN
SELECTED DIALYSIS CENTRES AT THE KLANG VALLEY,
MALAYSIA***

MOHAMMAD SYAFIQ BIN MD ALI

FPSK(m) 2020 40



**DEVELOPMENT AND VALIDATION OF FOOD FREQUENCY
QUESTIONNAIRE FOR URBAN HEMODIALYSIS POPULATION IN
SELECTED DIALYSIS CENTRES AT THE KLANG VALLEY, MALAYSIA**

By

MOHAMMAD SYAFIQ BIN MD ALI

**Thesis Submitted to the School of Graduate Studies,Universiti Putra Malaysia, in
Fulfilment of the Requirement for the Degree of Master of Science**

March 2020

COPYRIGHT

All materials contained within the thesis including without limitation text, logos, icons, photographs and all other artworks are copyright material of Universiti Putra Malaysia unless otherwise stated. Use may be made of any material contained within the thesis for non-commercial purposes from copyright holder. Commercial use of materials may only be made with the express, prior, written permission of Universiti Putra Malaysia.

Copyright © Universiti Putra Malaysia



DEDICATION

This thesis is dedicated to my parents and my lovely wife.



Abstract of thesis presented to Senate of Universiti Putra Malaysia in fulfillment of the requirements for the degree of Master of Science

**DEVELOPMENT AND VALIDATION OF FOOD FREQUENCY
QUESTIONNAIRE FOR URBAN HEMODIALYSIS POPULATION IN
SELECTED DIALYSIS CENTRES AT THE KLANG VALLEY, MALAYSIA**

By

MOHAMMAD SYAFIQ BIN MD ALI

March 2020

Chairman: Zulfitri 'Azuan Mat Daud, PhD
Faculty : Medicine and Health Sciences

Dietary assessment among hemodialysis population plays a crucial role in evaluating the quality of patients' dietary intake. Adequate dietary intake will prevent malnutrition thus decrease the mortality rate among the population. A rapid and reliable tool that can be appropriately applied to quantify macronutrients and micronutrients consumed by Malaysian hemodialysis population is lacking. Therefore, the aim of this study is to develop and validate a food frequency questionnaire (FFQ) applicable to assess dietary intake for urban hemodialysis population in Malaysia. This study was divided into three phases: Phase I was the development of the FFQ whilst Phase II and Phase III provided for the validation of the FFQ. In Phase I, three days dietary recall (3DDR) from 388 subjects in the 'Nutrition Status and Lifestyle Assessment in Hemodialysis Population, Malaysia' study was selected based on inclusion criteria, and were used to construct a food item list using the Block's method. A food nutrient database was then built inclusive of macro- and micronutrients. In Phase II, face validation ($n=10$) and content validation ($n=10$) were carried out. The final FFQ consisted of 123 food items. In Phase III, relative validation was then carried out with 121 subjects selected through consecutive sampling method [Malay=64%, Chinese=23% and Indian=13%; female=45%, male=55%; mean age=53±12 years; blood pressure=155/83, Malnutrition Inflammation Score ≥ 6 (Malnourished=24%)]. Anthropometry, biochemical profiles and dietary assessment for these subjects were assessed. The face validation of the FFQ indicated most food groups were well understood by lay persons and nutrition experts with the exception for 'cooked rice' groups ($p<0.05$). Mean time to complete the FFQ was 42±5 minutes. The mean difference for absolute intakes of total energy, carbohydrate, protein, total fat, sodium, potassium, phosphate, calcium and iron assessed by 3DDR and FFQ were significant ($p<0.01$). There was a significant correlation between FFQ and 3DDR assessments when comparing absolute intakes for total energy, carbohydrate, protein, total fat, sodium, potassium, phosphate, calcium and iron with correlations ranging from 0.35-0.47 ($p<0.01$). Cross-quartile classification indicated 70% to 82% subjects were classified into same or adjacent quartiles and 3.3% to 7.4% subjects were grossly misclassified

when comparing absolute intakes assessed by FFQ and 3DDR. Bland-Altman plots showed more than 90% of subjects were scattered within the limit of agreement for all the nutrients between FFQ and 3DDR. This FFQ was developed appropriate to assess dietary intake of urban Malaysian hemodialysis population. The FFQ is suitable to be applied in nutritional epidemiological studies to assess populations' diets contribute to malnutrition or any other health conditions.



Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk Ijazah Sarjana Sains

**PEMBANGUNAN DAN PENGESAHAN BORANG SOAL SELIDIK
KEKERAPAN MAKANAN DALAM KALANGAN POPULASI
HEMODIALISIS DI PUSAT DIALISIS TERPILIH DI LEMBAH KLANG,
MALAYSIA**

Oleh

MOHAMMAD SYAFIQ BIN MD ALI

Mac 2020

Pengerusi : Zulfitri 'Azuan Mat Daud, PhD
Fakulti : Perubatan dan Sains Kesihatan

Penilaian diet dalam kalangan pesakit hemodialisis memainkan peranan penting dalam menilai kualiti pengambilan makanan pesakit. Pengambilan makanan yang mencukupi akan mencegah malnutrisi sekali gus mengurangkan kadar kematian dalam kalangan pesakit. Alat yang pantas dan tepat yang boleh digunakan untuk mengukur makronutrien dan mikronutrien yang diambil oleh pesakit hemodialisis di Malaysia adalah kurang. Oleh itu, matlamat kajian ini adalah untuk membina dan mengesahkan borang soal selidik kekerapan makanan (*FFQ*) yang digunakan untuk menilai pengambilan makanan bagi pesakit hemodialisis yang tinggal di kawasan bandar di Malaysia. Kajian ini dibahagikan kepada tiga fasa: Fasa I adalah pembangunan *FFQ* manakala Fasa II and Fasa III disediakan untuk pengesahan *FFQ*. Pada Fasa I, pengambilan pemakanan tiga hari (*3DDR*) daripada 388 subjek yang terlibat dalam kajian 'Status Pemakanan dan Penilaian Gaya Hidup dalam Populasi Hemodialisis, Malaysia' dipilih berdasarkan inklusi kriteria dan digunakan untuk membina senarai makanan dengan menggunakan kaedah *Blok*. Pangkalan data nutrien makanan kemudian dibina termasuk makro- dan mikronutrien. Dalam Fasa II, pengesahan muka *FFQ* ($n = 10$) dan pengesahan kandungan *FFQ* ($n = 10$) telah dijalankan. *FFQ* yang akhir terdiri daripada 123 item makanan. Dalam Fasa III, pengesahan relatif kemudian dilakukan dengan 121 subjek yang dipilih melalui kaedah pensampelan berturut-turut (Melayu = 64%, Cina = 23% dan India = 13%; perempuan = 45%, lelaki = 55%; purata umur = 53 ± 12 tahun; tekanan darah = 155/83; Skor Keradangan Malnutrisi ≥ 6 (Malnutrisi = 24%). Penilaian antropometri, profil biokimia dan penilaian pemakanan untuk subjek ini dinilai. Pengesahan muka *FFQ* menunjukkan kebanyakan kumpulan makanan difahami dengan baik oleh orang awam dan pakar pemakanan kecuali kumpulan 'beras yang dimasak' ($p < 0.05$). Purata masa untuk melengkapkan *FFQ* ialah 42 ± 5 minit. Perbezaan purata bagi pengambilan mutlak jumlah tenaga, karbohidrat, protein, jumlah lemak, natrium, kalium, fosfat, kalsium dan zat besi yang dinilai oleh *3DDR* dan *FFQ* adalah signifikan ($p < 0.01$). Terdapat korelasi yang signifikan antara penilaian *FFQ* dan *3DDR* apabila membandingkan pengambilan mutlak untuk jumlah tenaga, karbohidrat, protein, jumlah

lemak, natrium, kalium, fosfat, kalsium dan zat besi dengan korelasi antara 0.35-0.47 ($p < 0.01$). Klasifikasi kuartil bersilang menunjukkan 70% hingga 82% subjek diklasifikasikan ke dalam kuartil yang sama atau bersebelahan dan 3.3% hingga 7.4% subjek telah diklasifikasikan dalam kuartil yang bertentangan apabila dibandingkan pengambilan mutlak yang dinilai oleh *FFQ* dan *3DDR*. Plot *Bland-Altman* menunjukkan lebih daripada 90% subjek berada dalam had persetujuan bagi semua nutrien apabila dibandingkan antara *FFQ* dan *3DDR*. *FFQ* yang dibangunkan ini sesuai digunakan untuk menilai pengambilan makanan pesakit hemodialisis yang tinggal di kawasan bandar di Malaysia. *FFQ* ini juga sesuai untuk digunakan dalam kajian epidemiologi pemakanan untuk menilai diet populasi hemodialisis dan perkaitannya dengan kekurangan zat makanan atau keadaan kesihatan lain.



ACKNOWLEDGEMENTS



First of all, all prasies is to Allah S.W.T as with His divine Wisdom and Mercy, I am able to complete this research project. Nonetheless, I would like to take this opportunity to express my appreciation to every person who motivates, helps and contributes in completing this research project directly or indirectly. I would like to give my earnest gratefulness to my supervisor, Dr. Zulfitri 'Azuan Mat Daud for his constant involvement, useful opinion and his supervision throughout the project. His unlimited patience, support and motivation was one of the reason that keeps me going throughout this Master's journey.

Furthermore, I would also like to wish a million thanks to my co-supervisors, Prof. Tikalavati and Dr. Nor Fahdlina, who contributed in giving brilliant suggestions, supports and constant engagement in aiding me to complete the project. A million thanks also to my senior (Zu Wei), nephrologist, and dietitians for their guidance and wisdom throughout this project.

Not to forget, I would like to thank my family especially to my parents, Md Ali Elias and Sa'adiyah Ahmad, who pray for my success day and night, and my siblings, Sazali, Zaidah, Sideq, Haslin, Salleh, Najihah, Aisyah and Sabaruddin who had shown me their continuous support and encouragement. To my wife, Hanis Najwa, thank you for being patiently waiting and pray for my success to finish this project. I would also like to appreciate all my postgraduate partners and members – Kent, Tasha, Fatin, Iman, Alvin, Imliya, Cordelea, Jazlina, Ban Hock, Sharmela, Birinder, Ayesha, Dr. Sree – and all my friends (Asri, Yen, Syahir, Bunyamin, Adi, Dila, Kak Aisyah, Diyanah, Hasanah, Wan, Shahirah, Nur Hafizah, Dahlan, Anuar, Hanum, Krystal, Zarith, and Farah Farhanah) who have been my inspiration, motivation and support all these years.

Last but not least, to the hemodialysis patients that participate in this project and to the dialysis staff, thank you for all the help and support. Special thanks are given to the Faculty of Medicine and Health Sciences for giving me a good environment and facilities. I doubt that this project will be possible without the support from the people that I have mentioned above. Thank you very much. Wassalam.

Syafiq Ali, 2020

This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirements for the degree of Master of Science. The members of the Supervisory Committee were as follows:

Zulfitri ‘Azuan Mat Daud, PhD

Senior Lecturer
Faculty of Medicine and Health Sciences
Universiti Putra Malaysia
(Chairperson)

Nor Fadhlina Zakaria, MD

Medical Lecturer
Faculty of Medicine and Health Sciences
Universiti Putra Malaysia
(Member)

Tilakavati A/P Karupaiah, PhD

Professor
Faculty of Health & Medical Sciences
Taylor’s University
(Member)

ZALILAH MOHD SHARIFF, PhD

Professor and Dean
School of Graduate Studies
Universiti Putra Malaysia

Date: 13 August 2020

Declaration by graduate student

I hereby confirm that:

- this thesis is my original work;
- quotations, illustrations and citations have been duly referenced;
- this thesis has not been submitted previously or concurrently for any other degree at any other institutions;
- intellectual property from the thesis and copyright of thesis are fully-owned by Universiti Putra Malaysia, as according to the Universiti Putra Malaysia (Research) Rules 2012;
- written permission must be obtained from supervisor and the office of Deputy Vice-Chancellor (Research and Innovation) before thesis is published (in the form of written, printed or in electronic form) including books, journals, modules, proceedings, popular writings, seminar papers, manuscripts, posters, reports, lecture notes, learning modules or any other materials as stated in the Universiti Putra Malaysia (Research) Rules 2012;
- there is no plagiarism or data falsification/fabrication in the thesis, and scholarly integrity is upheld as according to the Universiti Putra Malaysia (Graduate Studies) Rules 2003 (Revision 2012-2013) and the Universiti Putra Malaysia (Research) Rules 2012. The thesis has undergone plagiarism detection software.

Signature: _____ Date: _____

Name and Matric No.: Mohammad Syafiq bin Md Ali, GS45636

Declaration by Members of Supervisory Committee

This is to confirm that:

- the research conducted and the writing of this thesis was under our supervision;
- supervision responsibilities as stated in the Universiti Putra Malaysia (Graduate Studies) Rules 2003 (Revision 2012-2013) are adhered to.

Signature: _____
Name of Chairman of
Supervisory
Committee: Dr. Zulfitri 'Azuan Mat Daud

Signature: _____
Name of Member of
Supervisory
Committee: Dr. Fadhlina Zakaria

Signature: _____
Name of Member of
Supervisory
Committee: Prof. Dr. Tilakavati A/P Karupaiah

TABLE OF CONTENTS

	Page
ABSTRACT	i
ABSTRAK	iii
ACKNOWLEDGEMENTS	v
APPROVAL	vi
DECLARATION	viii
LIST OF TABLES	xiii
LIST OF FIGURES	xv
LIST OF ABBREVIATIONS	xvi
CHAPTER	
1 INTRODUCTION	1
1.1 Research background	1
1.2 Problem statement	3
1.2.1 Research question	3
1.2.2 Research justification	3
1.3 Research objectives	5
1.3.1 General objective	5
1.3.2 Specific objectives	5
1.4 Research hypothesis	5
1.5 Conceptual framework	5
2 LITERATURE REVIEW	7
2.1 Importance of dietary assessment	7
2.2 Epidemiological studies assessing dietary intake among HD population	7
2.3 Nutritional issues in HD population	8
2.4 Dietary assessment method	10
2.4.1 Diet record	11
2.4.1.1 Strength and limitations of diet record	11
2.4.2 Diet history	12
2.4.2.1 Strength and limitations of diet history	12
2.4.3 Diet recall	13
2.4.3.1 Strength and limitations of diet recall	13
2.4.4 Food Frequency Questionnaire (FFQ)	14
2.4.4.1 Strength and limitations of FFQ	15
2.4.5 Micronutrient assessment using dietary assessment method	15
2.5 Challenges in dietary assessment	16
2.5.1 Underreporting	17
2.5.2 Variation in dietary intake	17
2.5.3 Supplement usage	18
2.5.4 Errors in subjects and researchers	18
2.5.5 Dietary intake analysis	18
2.5.6 Selection of dietary assessment method	19

2.6	Anthropometry assessment	19
2.7	Nutritional assessment using MIS tool	20
2.8	Food Frequency Questionnaire	20
2.8.1	Principle of development	20
2.8.2	Component of the FFQ	21
	2.8.2.1 The food list	22
	2.8.2.2 Frequency response option	23
	2.8.2.3 Estimation of portion size	23
2.8.3	Errors in portion size estimation	24
2.8.4	Principal of validation	24
	2.8.4.1 Study population	25
	2.8.4.2 Sample size	25
	2.8.4.3 Reference methods	25
	2.8.4.4 Required recording days	26
	2.8.4.5 Sequence of administration	27
	2.8.4.6 Statistical analysis	27
2.9	FFQ developed and validation in Malaysia	29
3	METHODOLOGY	30
3.1	Phase I: Development of HD-FFQ	30
	3.1.1 Selection of dietary records	31
	3.1.2 Sample size calculation	31
	3.1.3 Development of the food item list	32
3.2	Validation of HD-FFQ	35
	3.2.1 Phase II: Face and content validity of HD-FFQ	36
	3.2.2 Phase III: Relative validity of HD-FFQ	36
	3.2.2.1 Selection criteria	37
	3.2.2.2 Sample size calculation	37
	3.2.2.3 Data collection procedures	38
	3.2.2.4 Analysis of dietary information from 3DDR and HD-FFQ	41
3.3	Statistical analysis	42
4	RESULTS	44
4.1	Phase I: Development of HD-FFQ	44
	4.1.1 Characteristics of patients in Phase I	44
	4.1.2 Description of the HD-FFQ	46
4.2	Phase II: Face and content validation of HD-FFQ	47
4.3	Phase III: Relative validation of HD-FFQ	51
	4.3.1 Patient recruitment	51
	4.3.2 Study population characteristics	52
	4.3.3 Dietary intake measurement using HD-FFQ and reference method	57
	4.3.4.1 Macronutrient and micronutrients intake comparisons	57
	4.3.4.2 Correlations between HD-FFQ and 3DDR	59
4.3.4	Agreement between HD-FFQ and reference method	66
	4.3.4.1 Mean difference between nutrients calculated as per HD-FFQ and 3DDR	66

	4.3.4.2	Cross-quartile classification between HD-FFQ and 3DDR	66
	4.3.4.3	Bland-Altman plot for macro- and micronutrients derived by 3DDR and HD-FFQ methods	67
5	DISCUSSION		73
	5.1	Phase I: Development of HD-FFQ	73
	5.2	Phase II: Face and content validation of HD-FFQ	74
	5.3	Phase III: Relative validation of HD-FFQ	74
	5.4	Subject characteristics in comparison to other reported data	75
	5.5	Nutrient intakes of patients in comparison with other reported data	78
	5.6	Validity test between HD-FFQ and reference method	80
	5.6.1	Correlation between HD-FFQ and 3DDR	80
	5.6.2	Correlation of HD-FFQ and 3DDR with serum biomarkers	81
	5.6.3	Agreement between HD-FFQ and 3DDR	85
6	CONCLUSION		88
	6.1	Conclusion	88
	6.2	Strength and limitations	88
	6.3	Recommendations for future research	89
	REFERENCES		91
	APPENDICES		128
	BIODATA OF STUDENT		186

LIST OF TABLES

Table	Page
3.1 Subject's inclusion and exclusion criteria for Phase I	31
3.2 Characteristics of subjects for Phase II: Face and content validity	36
3.3 Subject's inclusion and exclusion criteria for Phase III	37
3.4 Conversion factor for the frequency of food item intake	41
3.5 Classification of under, normal, and over reporting	42
3.6 Formula for calculating the basal metabolic rate	42
4.1 Patient characteristics in Phase I	45
4.2 Food item listing in the HD-FFQ	46
4.3 Individual food groupings score of experts and lay persons	48
4.4 Summary of validator comments	49
4.5 Final food item list of the HD-FFQ	50
4.6 Identification of misreporters according to EI: BMR category	51
4.7 Sociodemographic characteristics of Phase III patients	53
4.8 Categorization of mortality risk in patients based on MIS scores	54
4.9 Anthropometry, clinical characteristics, body composition and functional status of Phase III patients	55
4.10 Biochemical profile of study patients	56
4.11 Macro- and micronutrients intake of Phase III patients	58
4.12 Correlations between HD-FFQ and 3DDR as per nutrients with unadjusted and adjusted co-variates	60
4.13 Correlations between HD-FFQ and serum renal profile as per nutrients	62
4.14 Correlation between 3DDR and serum renal profile as per nutrients	62
4.15 Correlation between HD-FFQ and serum lipid profile as per nutrients	64
4.16 Correlation between 3DDR and serum lipid profile as per nutrients	64
4.17 Correlation as per nutrients measured by HD-FFQ method with serum liver function test and total blood count	65
4.18 Correlation as per nutrients measured by the 3DDR method with serum liver function test and total blood count	65
4.19 Mean dietary nutrient intake differences between HD-FFQ and 3DDR	66
4.20 Cross-quartile classification of nutrients derived by HD-FFQ and 3DDR methods	67
A Dietary assessment method used among HD population in previous epidemiological studies	128

B	Development and validation studies of FFQ in Malaysia	131
C	CVI-Score Calculation	156



LIST OF FIGURES

Figure		Page
1.1	Conceptual framework	6
3.1	Flow Chart of Phase I	34
3.2	Flow Chart of Phase II & III	35
4.1	Flow chart of patient recruitment	51
4.2	Bland-Altman plots between 3DDR and HD-FFQ for total energy	68
4.3	Bland-Altman plots between 3DDR and HD-FFQ for carbohydrate	69
4.4	Bland-Altman plots between 3DDR and HD-FFQ for protein	69
4.5	Bland-Altman plots between 3DDR and HD-FFQ for total fat	70
4.6	Bland-Altman plots between 3DDR and HD-FFQ for sodium	70
4.7	Bland-Altman plots between 3DDR and HD-FFQ for potassium	71
4.8	Bland-Altman plots between 3DDR and HD-FFQ for phosphate	71
4.9	Bland-Altman plots between 3DDR and HD-FFQ for calcium	72
4.10	Bland-Altman plots between 3DDR and HD-FFQ for iron	72
A	Frankfurt plane position	133
B	Midpoint between acromion and olecranon process	133
C	Mid-arm circumference measurement	134
D	Tricep skinfold measurement	134
E	Handgrip measurement	135
F	Household measurement	135

LIST OF ABBREVIATIONS

AARP	American Association of Retired Person
ACE	Angiotensin converting enzyme
BP	Blood pressure
BMI	Body mass index
BMR	Basal metabolic rate
BW	Body weight
CKD	Chronic Kidney Disease
CVI	Content validation index
CVD	Cardiovascular Disease
CHO	Carbohydrate
DHQ	Diet History Questionnaire
DBP	Diastolic blood pressure
DEI	Dietary energy intake
DPI	Dietary protein intake
eGFR	Estimated Glomerular Filtration Rate
EPIC	European Prospective Investigation into Cancer
EI	Energy Intake
ESRD	End-Stage Renal Disease
FFQ	Food Frequency Questionnaire
FAO	Food Agriculture Organisation
GM	Grossly misclassified
HD	Hemodialysis
HGS	Hand-grip strength
HD-FFQ	Hemodialysis-Food Frequency Questionnaire
HTN	Hypertension
HDL-C	High density lipoprotein cholesterol
Hb	Haemoglobin
HBV	High Biological Value
ISAK	International Society for the Advancement of Kinanthropometry
IDWG	Interdialytic weight gain
K	Potassium
KDIGO	Kidney Disease Improving Global Outcome
KDOQI	Kidney Disease Outcome Quality Initiative
LER	Low energy reporters
LOA	Limit of agreement
LDL-C	Low density lipoprotein cholesterol
MAC	Mid-arm circumference
MBD	Mineral Bone Disorder
MANS	Malaysian Adult Nutrition Survey

MUFA	Monounsaturated Fatty Acid
MIS	Malnutrition Inflammation Score
MAMC	Mid-arm muscle circumference
MAMA	Mid-arm muscle area
MD	Mean difference
NHANES	National Health and Nutrition Examination Survey
NSAIDs	Nonsteroidal anti-inflammatory drugs
NPA	Nitrogen protein appearance
PTH	Parathyroid hormone
pmp	per million population
PEW	Protein Energy Wasting
PD	Peritoneal Dialysis
PUFA	Polyunsaturated Fatty Acid
RRT	Renal Replacement Therapy
RNI	Recommended Nutrient Intakes
SD	Standard deviation
SBP	Systolic blood pressure
SPSS	Statistical Package for Social Sciences
SFA	Saturated Fatty Acid
TP	Total protein
TSF	Triceps skinfold thickness
TFA	Trans Fatty Acid
TG	Triglyceride
TC	Total cholesterol
TEI	Total energy intake
USRDS	United States Renal Data System
USDA	United States Department of Agriculture
WHO	World Health Organization
3DDR	3-Day Diet Recall

CHAPTER 1

INTRODUCTION

1.1 Research background

End-stage Renal Disease (ESRD) is the final stage of Chronic Kidney Disease (CKD) requiring the individuals to commence renal replacement therapy (RRT) (White et al., 2005). The prevalence of CKD and ESRD is increasing worldwide. In 2016, the prevalence of treated ESRD was highest in Taiwan with the prevalence of 3392 pmp (United States Renal Data System (USRDS), 2018). While in Japan, the United States and Singapore, the prevalence of ESRD were 2599, 2196 and 2076 pmp respectively for the same year. The prevalence of treated ESRD in Malaysia is 1352 pmp which was included in the ten countries having the highest percentage rise in ESRD prevalence rate from 2003 to 2016 (USRDS, 2018).

Individual diagnosed with ESRD once estimated glomerular filtration rate (eGFR) reached a value of less than 15ml/min/1.73m² and the functions of the kidney only works 10-15% which requires the individual to start RRT. There are several option of RRT available including hemodialysis (HD), peritoneal dialysis or renal organ transplant (National Kidney Foundation, 2002). The most common modality of RRT in Malaysia is HD treatment (Ghazali et al., 2016). HD is a procedure used to maintain a patient with ESRD by using an artificial kidney or known as dialyzer to replace the excretory function of the failed kidneys. Blood from the patient is pumped from the body through special tubing to the dialysis machine, where it circulates through the filtering membrane of dialyzer to remove toxic impurities and going back to the patient. The recommendation by Kidney Disease Outcome Quality Initiative (KDOQI) states that patients should at least undergo HD treatment three times a week and with the minimum dialysis time of three hours for each session (Daugirdas et al., 2015). The HD treatment recommendation in Malaysia is to have 4 hours per session and 3 treatments a week (National Kidney Foundation Malaysia, 2019).

HD patients generally require to follow certain pattern of dietary and lifestyle modifications. Adequate energy and protein consumption is important as HD patients are prone to become malnourished over the time (Abdallah & Yousif, 2016; Sabatino et al., 2017). Besides, long term insufficient dietary intake of calorie and protein will put the patients in protein-energy wasting (PEW) state whereby it increases the risk of morbidity and mortality (Alp Ikizler et al., 2013). Additionally, HD patients need to restrict fluid and certain micronutrients such as sodium, potassium, and phosphate as their body unable to regulate the excess fluid and micronutrients as normal healthy individuals (Blaine et al., 2015; Zoccali et al., 2017). Compliance failure to the dietary recommendation may incur life-threatening condition (Kalantar-Zadeh et al., 2015; Mc Causland, Waikar, & Brunelli, 2012; Noori, Kalantar-Zadeh, Kovesdy, Bross, et al., 2010; Noori, Kalantar-Zadeh, Kovesdy, Murali, et al., 2010; Tsuruya et al., 2015).

Dietary assessment, therefore, would play a crucial role in evaluating the quality of patients' dietary intake (Noori et al., 2010). In Malaysian research settings, the common dietary assessment method to assess nutritional intake among the HD population are the diet recall and food record (Harvinder et al., 2013, 2016; Sahathevan et al., 2015; Yusop et al., 2013). Both dietary assessment method of diet recall and food record need a trained personnel (i.e. dietitian) to interview the subjects and cross-checked the record to attain a genuine quality of dietary data (Gibson, 2005). However, to assess the usual dietary intake of the patients, multiple days of diet recall or food record are needed (Gibson, 2005). In a large population studies, usage of diet recalls/records to estimate average dietary intake of patients has several limitations including recording bias, high cost and burden for researcher as well as the subjects (i.e. need a trained personnel and participants) (Thompson & Subar, 2013).

Meanwhile, in clinical settings, the traditional method of dietary assessment (i.e. diet recall/record) were done by trained personnel (i.e. dietitian). However, a study by Khor et al. (2018) found that the availability of dietitian in Malaysian outpatient HD centres were limited and this retard the nutrition care process pathway of the patients. On the other hand, another study done by Hand et al. (2013) proves that even though there are dietitians in the clinics, they have constraint to perform a proper dietary assessment due to the limitation of time and high burden issues. This was supported by local national surveys among practising dietitians whereby they also face similar problems during dietary assessment among the HD patients which is lack of time and tools (Lim et al., 2019).

To cather the hurdle that arise, a proposed dietary assessment method that could fit in is the food frequency questionnaire (FFQ). The concept of FFQ was introduced by Burke (1947) that compared diet recall, food record and FFQ method to assess patient's average diet. The FFQ method in assessing habitual dietary intake of large population groups had gained importance after the work of Block et al. (1986). The Block's FFQ was initially developed from the National Health and Nutrition Examination Survey II (NHANES II) database in 1985 and the FFQ has been revised again in 1998 using NHANES III food database (Block, Wakimoto, & Block, 1998). In the United States, the FFQ has been used by over 700 research groups and public agencies (Block et al., 1998).

The usage of FFQ is less of a burden and easier to use and able to capture the usual dietary intake of subjects in large-scale epidemiological studies (Subar, Thompson, et al., 2001; Tucker, 2007). Furthermore, FFQ does not necessarily require dietitian as it can be self-administered by the patients itself and other healthcare professionals can administer the FFQ to assess their respective patients' dietary intake (Noori et al., 2010; Willett, 1998). In the development of the FFQ, food consumption data from a local representative population should be gathered and analyzed for its nutrient contribution. This is to identify food items and portion size usually consumed so that the included food items in the FFQ will reflect the usual consumption of the observed population (MacIntyre et al., 2001).

Any dietary questionnaire that is newly developed should be validated to ensure the tools are measuring the correct dietary info as invalid information will lead to a false association between dietary factors and diseases (Eng & Moy, 2011; Wakai, 2009). In conducting a validation study, FFQ measures are compared with an alternative method of assessing dietary intake i.e. 'gold standard' method (Cade, Thompson, Burley, & Warm, 2002). The suggested 'gold standard' reference method for FFQ validation studies is the weighed food record as it produce least correlated errors with the FFQ (Margetts & Nelson, 2010). However, not all FFQ validation studies able to conduct the 'gold standard' method as it imposed high respondent burden. Cade et al. (2002) that reviewed more than 200 FFQs validation studies observed that there are varieties of reference method used (i.e. weighed food record, food record or diary, 24-hour diet recall, diet history questionnaire) depends on the study design and limitations.

On the other hand, biomarkers measurements is not the main reference method for FFQ validation but it serves as an additional parameters to strengthen the validity of the newly developed FFQ (Cade et al., 2002). Biomarkers are useful in assessing validity because errors of measurement such as underreporting or poor memory recall are not present using this method (Brunner, Stallone, Juneja, Bingham, & Marmot, 2001). A study by Noori et al. (2010) found that HD patients with higher dietary potassium and phosphorus intake had higher pre-dialysis serum potassium and phosphorus levels. Another study was done by Eyberg, Pettifor and Moodley (1986) also shows a significant relationship between dietary calcium intakes with serum calcium levels. These serum biomarkers could be useful to estimate the intake of micronutrients proportionally taken by the individual.

1.2 Problem statement

1.2.1 Research question

Will the newly developed FFQ be able to assess macro- and micronutrients intake in Malaysian HD patients correctly?

1.2.2 Research justification

There are many FFQs that have been developed and validated worldwide, including in Malaysia. However, up to date, only two studies have published their FFQ specific for HD population (Kalantar-Zadeh et al., 2011; Delgado et al., 2014). A study by Kalantar-Zadeh et al. (2011) emphasized the design and development of the FFQ only with no validation against any reference method, thus the validity of their FFQ still needs further work. On the other hand, a study by Delgado et al. (2014) modified the existing Block's FFQ and tailored the food items specific to HD population and comparing it against food record. Both the FFQ consisting of food item that are not tailored to the local Malaysian food database. Therefore, it is inappropriate to use it among our Malaysian HD populations.

In Malaysia, there are a total of 21 FFQs that have been developed, but none are tailored for HD population. From the 21 FFQs, nine of them were developed for multi-ethnic adult, four of them were developed for elderly population, three of them were for

pregnant women population, four of them for multi-ethnic children and adolescent, and one was developed for cataract patient population. Each of the FFQs were assessing different types of nutrients namely energy, macro- and micronutrients, vitamins, minerals and some organic compound i.e. polyphenol and genistein which depends on the population and study objective. The developed FFQs were not suitable to be used in HD population in Malaysia due to the food item listed were not appropriate to the population and different types of nutrients assessment.

Since HD patients are exposed to nutritional issues such as protein-energy wasting, electrolyte imbalances as well as fluid overload (Fouque et al., 2008; Kalantar-Zadeh et al., 2015), therefore, a proper dietary assessment tool is needed to evaluate patients' dietary intake. Current dietary assessment method (i.e. diet recall and diet record) among the HD population in clinical settings were rarely done due to limitations of time and high burden during data recording and analysis (Hand et al., 2013). Meanwhile, in research setting, the use of diet recall and records to estimate average dietary intake of patient's requires involvement of high numbers of trained personnel (i.e. dietitian), this increases the cost and time of assessment (Gibson, 2005; Willett, 1998). Additionally, with the emerging number of research in Malaysian HD population calls for an instrument, which is non-invasive, time-saving and inexpensive, and has been known most suited in nutritional epidemiological studies (Cade et al., 2002).

Results from Khor et al. (2018) national survey reveals that the assessment of dietary intake among Malaysian outpatient HD clinics were scarce due to limited number of dietitian available. Since the FFQ assessment does not necessarily require dietitian skills, it can be used by other healthcare professional or by the patients itself to assess their respective average dietary intake. It is known that the FFQ can be answered easily with correct guidance and does not burden the patient's (Molag et al., 2007; Rodrigo et al., 2015). Other issues pertaining dietary assessment among HD population is limitation to assess and analyze the related micronutrients intakes (i.e. sodium, potassium, phosphate). Surveys among practicing renal dietitians reported lack of time and tools to collect and analyze the dietary information including micronutrients intake of the HD patients (Hand et al., 2013). Another nationwide surveys among practising Malaysian dietitian also face the same concern where majority of them only estimated the micronutrients intake of the HD patients through food checklist as they reported having a limited information on the micronutrients content of the food items (Lim et al., 2019). This situation demands the development of the FFQ which could help in assessment of the micronutrients intake among the HD patients.

The development of this new FFQ specific for HD patients would give the practising dietitian a better option for dietary intake evaluation of the patients. Problem among the practising dietitians regarding lack of time and tools to analyse dietary info especially the micronutrients intake could be elevated with the presence of this newly developed FFQ. Besides that, in view of the limited numbers of dietitians availability in the Malaysian outpatient HD clinics, this FFQ would serve as new tools for the other healthcare providers (i.e. medical doctors, dialysis nurse) to assess thier patients dietary adequacy. A proper dietary evaluation could identify, stratify the patient who are at risk and those who need the dietary intervention. Early nutrition intervention for those who

need it may reduce hospitalizations, morbidity, mortality and eventually improve the patients outcomes.

1.3 Research objectives

1.3.1 General objective

To develop and validate an FFQ specific for Malaysian HD patients.

1.3.2 Specific objectives

1. Phase I: To develop a FFQ instrument from dietary records collected from HD patients.
2. Phase II: To validate the FFQ through face and content validation.
3. Phase III: To validate the FFQ through relative validation with 3DDR and serum biomarkers in a HD patients population.

1.4 Research hypothesis

The HD-FFQ will be a valid tool in assessing and ranking dietary intake for urban HD population.

1.5 Conceptual framework

Figure 1.1 showing the conceptual framework of the study. The process of development and validation of the HD-FFQ involve three phases. Phase I was the development of the HD-FFQ based on the method introduced by Block et al. (1986). In Block's method, they selected the food items for the development of the diet questionnaire based on large set of database in specific population of interest. Food items were selected on the basis of their contribution to total population intake of energy and selected nutrients, and represent over 90% of each of those nutrients. In Phase II, face and content validation was done through the experts and layperson views as proposed by Yeak (2016) and Haynes et al. (1995). The face validation was deemed to improve the flow of the questionnaire whilst the content validation is to assess the relevance of the elements of an assessment instrument and representativeness of the targeted construct for a particular assessment purpose (Cook & Beckman, 2006; Haynes et al., 1995).

Phase III was the validation of the newly developed HD-FFQ with the available reference method (i.e. another dietary assessment method). The suggested 'gold standard' for dietary assessment method for reference was weighed food record as it possess different errors compared to the test method (i.e. FFQ) (Margetts & Nelson, 2010). However, due to high subjects burden and practicality, 3-days diet recall (3DDR) was used as main reference method instead as it has been recommended in clinical practice guideline of K/DOQI as an adequate dietary assessment method for HD patients (Kopple, 2001). An additional parameters (i.e. serum biomarkers) was used to serve as an added reference method to strengthen the validity of the newly developed FFQ (Cade et al., 2002). The statistical analysis to test the validity of the HD-FFQ and the reference method included

correlation coefficients, comparison of means, cross-classifications and Bland-Altman analysis (Lombard et al., 2015).

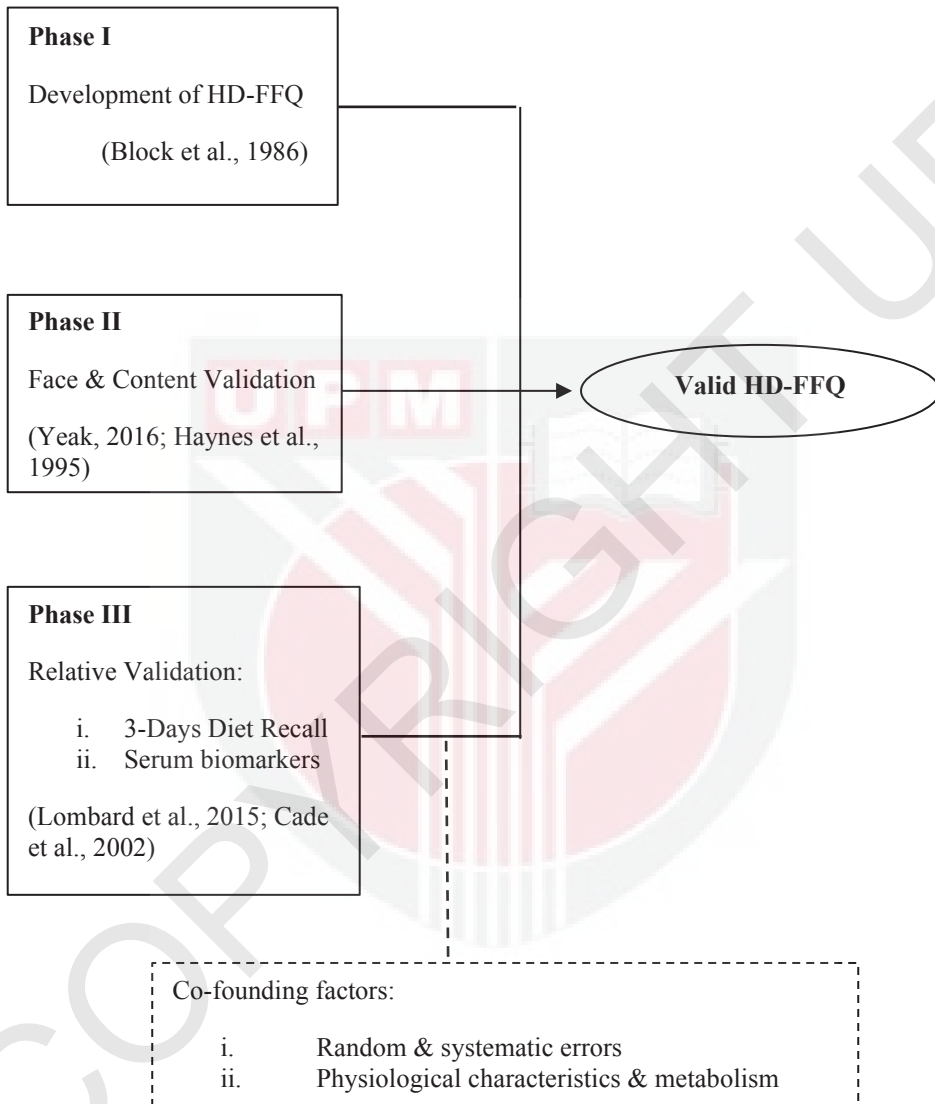


Figure 1.1: Conceptual framework of the study.

REFERENCES

- Abdallah, S. A. K., & Yousif, Y. B. (2016). Nutritional Intervention of Adequate Calorie and Protein Intake Improve Malnutrition Among Hemodialysis Patients. *EC Nutrition*, 5(2), 1110–1119.
- Abdul Basir, S. M., Mohd. Shukri, N. A., Abdul Ghani, R., Ibrahim, M., Khattak, M. M. A. K., & Omar, M. N. (2018). Assessment of prophetic foods consumption among lactating mothers: Combining quantitative & qualitative approaches. *The International Medical Journal Malaysia*, 17, 181–185. http://irep.iium.edu.my/65110/2/65110_Assessment%20of%20Prophetic%20Foods%20Consumption%20among%20Lactating%20Mothers%20Combining%20Quantitative%20%26%20Qualitative%20Approaches_WOS.pdf
- Abdul Majid, H., Ramli, L., Ying, S. P., Su, T. T., Jalaludin, M. Y., & Abdul Mohsein, N. A.-S. (2016). Dietary Intake among Adolescents in a Middle-Income Country: An Outcome from the Malaysian Health and Adolescents Longitudinal Research Team Study (the MyHeARTs Study). *PLoS One*, 11(5), e0155447. <https://doi.org/10.1371/journal.pone.0155447>
- Adanan, N. I. H., Md Ali, M. S., Lim, J. H., Zakaria, N. F., Lim, C. T. S., Yahya, R., Abdul Gafor, A. H., Karupaiah, T., & Daud, Z. 'Azuan M. (2020). Investigating Physical and Nutritional Changes During Prolonged Intermittent Fasting in Hemodialysis Patients: A Prospective Cohort Study. *Journal of Renal Nutrition*, 30(2), e15–e26. <https://doi.org/10.1053/j.jrn.2019.06.003>
- Affret, A., Wagner, S., El Fatouhi, D., Dow, C., Correia, E., Niravong, M., Clavel-Chapelon, F., De Chefdebien, J., Fouque, D., Stengel, B., Stengel, B., Jacquelinet, C., Robinson, B., Massy, Z. A., Combe, C., Fouque, D., Laville, M., Frimat, L., Ayav, C., ... on behalf of CKD-REIN study investigators. (2017). Validity and reproducibility of a short food frequency questionnaire among patients with chronic kidney disease. *BMC Nephrology*, 18(1), 297. <https://doi.org/10.1186/s12882-017-0695-2>
- Agarwal, R., & Weir, M. R. (2010). Dry-Weight: A Concept Revisited in an Effort to Avoid Medication-Directed Approaches for Blood Pressure Control in Hemodialysis Patients. *Clinical Journal of the American Society of Nephrology: CJASN*, 5(7), 1255–1260. <https://doi.org/10.2215/CJN.01760210>
- Alipoor, M. E., Hosseinzadeh, D. M. J., Attar, Mahdavi, D. M., Mazdeh, Shadnoush, D. M., & Yaseri, D. M. (2016). The comparison of dietary intake and appetite between normal weight and obese patients under hemodialysis. *Teb va Tazkiyeh*, 24(2), 83–96.
- Almajwal, A., AL-zahrani, S., Abulmeaty, M., Alam, I., Razzak, S., & Alqahtani, A. (2018). Development of Food Frequency Questionnaire (FFQ) for the assessment of dietary intake among overweight and obese Saudi young children. *Nutrire*, 43(1), 29. <https://doi.org/10.1186/s41110-018-0088-8>
- Alp Ikizler, T., Cano, N. J., Franch, H., Fouque, D., Himmelfarb, J., Kalantar-Zadeh, K., Kuhlmann, M. K., Stenvinkel, P., TerWee, P., Teta, D., Wang, A. Y.-M., & Wanner, C. (2013). Prevention and treatment of protein energy wasting in chronic kidney disease patients: A consensus statement by the International Society of Renal Nutrition and Metabolism. *Kidney International*, 84(6), 1096–1107. <https://doi.org/10.1038/ki.2013.147>

- Alshatwi, A. A., Alshmary, A., & Al-Khalifa, A. (2007). Nutritional Assessment of Hemodialysis Patients. *Journal of Medical Sciences*, 7, 294–298. <https://doi.org/10.3923/jms.2007.294.298>
- Amin, N. U., Asad, M. J., Raja, A. M., & Mahmood, R. T. (2014). Evaluating Urea and Creatinine Levels in Chronic Renal Failure Pre and Post Dialysis: A Prospective Study. *Journal of Cardiovascular Disease*, 2(2).
- Arab, L. (2003). Biomarkers of Fat and Fatty Acid Intake. *The Journal of Nutrition*, 133(3), 925S–932S. <https://doi.org/10.1093/jn/133.3.925S>
- Arsenault, L. N., Matthan, N., Scott, T. M., Dallal, G., Lichtenstein, A. H., Folstein, M. F., Rosenberg, I., & Tucker, K. L. (2009). Validity of Estimated Dietary Eicosapentaenoic Acid and Docosahexaenoic Acid Intakes Determined by Interviewer-Administered Food Frequency Questionnaire Among Older Adults With Mild-to-Moderate Cognitive Impairment or Dementia. *American Journal of Epidemiology*, 170(1), 95–103. <https://doi.org/10.1093/aje/kwp089>
- As'habi, A., Tabibi, H., Rad, A. H., Heshmati, B. N., Mahdavi-Mazdeh, M., & Hedayati, M. (2011). Dietary assessment of hemodialysis patients in Tehran, Iran. *Hemodialysis International*, 15(4), 530–537. <https://doi.org/10.1111/j.1542-4758.2011.00582.x>
- Askar, A. (2015). Hyperphosphatemia. The hidden killer in chronic kidney disease. *Saudi Medical Journal*, 36(1), 13–19. <https://doi.org/10.15537/smj.2015.1.9843>
- Askar, A. M. (2015). Hyperphosphatemia. *Saudi Medical Journal*, 36(1), 13–19. <https://doi.org/10.15537/smj.2015.1.9843>
- Azad Tehrani, M., Sabry, Prof. Dr. Y., Elkersh, Prof. Dr. M., & Elsharkawy, Dr. A. A. (2020). Assessment of Nutrition Status of Children with Chronic Renal Failure Undergoing Hemodialysis. *Tanta Scientific Nursing Journal*, 9(2), 157–183. <https://doi.org/10.21608/tsnj.2020.74532>
- Azadibakhsh, N., Hosseini, R. S., Atabak, S., Nateghiyan, N., Golestan, B., & Rad, A. H. (2009). Efficacy of folate and vitamin B12 in lowering homocysteine concentrations in hemodialysis patients. *Saudi Journal of Kidney Diseases and Transplantation*, 20(5), 779.
- Babić, D., Sindik, J., & Missoni, S. (2014). Development and Validation of a Self-Administered Food Frequency Questionnaire to Assess Habitual Dietary Intake and Quality of Diet in Healthy Adults in the Republic of Croatia. *Collegium Antropologicum*, 38(3), 1017–1026.
- Bal, Z., Demirci, B. G., Karakose, S., Tural, E., Erkmén Uyar, M., Acar, N. O., & Sezer, S. (2018). Factors Influencing Hemoglobin Variability and Its Association with Mortality in Hemodialysis Patients. *The Scientific World Journal*, 2018, 8065691. <https://doi.org/10.1155/2018/8065691>
- Baranowski, T., Islam, N., Douglass, D., Dadabhoy, H., Beltran, A., Baranowski, J., Thompson, D., Cullen, K. W., & Subar, A. F. (2014). Food Intake Recording Software System, version 4 (FIRSS4): A self-completed 24-h dietary recall for children: FIRSS4, version 4. *Journal of Human Nutrition and Dietetics*, 27(1), 66–71. <https://doi.org/10.1111/j.1365-277X.2012.01251.x>
- Baranowski, Tom, Beltran, A., Martin, S., Watson, K. B., Islam, N., Robertson, S., Berno, S., Dadabhoy, H., Thompson, D., Cullen, K., Buday, R., Subar, A. F., & Baranowski, J. (2010). Tests of the Accuracy and Speed of Categorizing Foods into Child vs Professional Categories Using Two Methods of Browsing with Children. *Journal of the American Dietetic Association*, 110(1), 91–94. <https://doi.org/10.1016/j.jada.2009.10.006>

- Baylin, A., & Campos, H. (2006). The use of fatty acid biomarkers to reflect dietary intake. *Current Opinion in Lipidology*, 17(1), 22–27.
- Baylin, A., Kabagambe, E. K., Siles, X., & Campos, H. (2002). Adipose tissue biomarkers of fatty acid intake. *The American Journal of Clinical Nutrition*, 76(4), 750–757. <https://doi.org/10.1093/ajcn/76.4.750>
- Beberashvili, I., Azar, A., Sinuani, I., Kadoshi, H., Shapiro, G., Feldman, L., Averbukh, Z., & Weissgarten, J. (2013). Comparison Analysis of Nutritional Scores for Serial Monitoring of Nutritional Status in Hemodialysis Patients. *Clinical Journal of the American Society of Nephrology*, 8(3), 443–451. <https://doi.org/10.2215/CJN.04980512>
- Becker, G. J., Walker, R. G., Hewitson, T. D., & Pedagogos, E. (2009). Phosphate levels—Time for a rethink? *Nephrology Dialysis Transplantation*, 24(8), 2321–2324. <https://doi.org/10.1093/ndt/gfp220>
- Bernal-Orozco, M. F., Vizmanos-Lamotte, B., Rodríguez-Rocha, N. P., Macedo-Ojeda, G., Orozco-Valerio, M., Rovillé-Sausse, F., León-Estrada, S., Márquez-Sandoval, F., & Fernández-Ballart, J. D. (2013). Validation of a Mexican food photograph album as a tool to visually estimate food amounts in adolescents. *British Journal of Nutrition*, 109(5), 944–952. <https://doi.org/10.1017/S0007114512002127>
- Berndt, T., Thomas, L. F., Craig, T. A., Sommer, S., Li, X., Bergstralh, E. J., & Kumar, R. (2007). Evidence for a signaling axis by which intestinal phosphate rapidly modulates renal phosphate reabsorption. *Proceedings of the National Academy of Sciences*, 104(26), 11085–11090. <https://doi.org/10.1073/pnas.0704446104>
- Bertin, M., Touvier, M., Dubuisson, C., Dufour, A., Havard, S., Lafay, L., Volatier, J.-L., & Lioret, S. (2016). Dietary patterns of French adults: Associations with demographic, socio-economic and behavioural factors. *Journal of Human Nutrition and Dietetics*, 29(2), 241–254. <https://doi.org/10.1111/jhn.12315>
- Beukers, M. H., Dekker, L. H., de Boer, E. J., Perenboom, C. W. M., Meijboom, S., Nicolaou, M., de Vries, J. H. M., & Brants, H. A. M. (2015). Development of the HELIUS food frequency questionnaires: Ethnic-specific questionnaires to assess the diet of a multiethnic population in The Netherlands. *European Journal of Clinical Nutrition*, 69(5), 579–584. <https://doi.org/10.1038/ejcn.2014.180>
- Bingham, S. A. (2002). Biomarkers in nutritional epidemiology. *Public Health Nutrition*, 5(6a), 821–827. <https://doi.org/10.1079/PHN2002368>
- Bingham, S. A. (2003). Urine Nitrogen as a Biomarker for the Validation of Dietary Protein Intake. *The Journal of Nutrition*, 133(3), 921S–924S. <https://doi.org/10.1093/jn/133.3.921S>
- Biruete, A., Jeong, J. H., Barnes, J. L., & Wilund, K. R. (2017). Modified Nutritional Recommendations to Improve Dietary Patterns and Outcomes in Hemodialysis Patients. *Journal of Renal Nutrition*, 27(1), 62–70. <https://doi.org/10.1053/j.jrn.2016.06.001>
- Black, A. E. (2000). Critical evaluation of energy intake using the Goldberg cut-off for energy intake: basal metabolic rate. A practical guide to its calculation, use and limitations. *International Journal of Obesity and Related Metabolic Disorders: Journal of the International Association for the Study of Obesity*, 24(9), 1119–1130.
- Black, A. E., & Cole, T. J. (2001). Biased over- or under-reporting is characteristic of individuals whether over time or by different assessment methods. *Journal of the American Dietetic Association*, 101(1), 70–80. [https://doi.org/10.1016/S0002-8223\(01\)00018-9](https://doi.org/10.1016/S0002-8223(01)00018-9)

- Blaine, J., Chonchol, M., & Levi, M. (2015). Renal Control of Calcium, Phosphate, and Magnesium Homeostasis. *Clinical Journal of the American Society of Nephrology*, 10(7), 1257–1272. <https://doi.org/10.2215/CJN.09750913>
- Bland, J. M., & Altman, D. G. (1986). Statistical Methods For Assessing Agreement Between Two Methods Of Clinical Measurement. *The Lancet*, 327(8476), 307–310. [https://doi.org/10.1016/S0140-6736\(86\)90837-8](https://doi.org/10.1016/S0140-6736(86)90837-8)
- Blanton, C. A., Moshfegh, A. J., Baer, D. J., & Kretsch, M. J. (2006). The USDA Automated Multiple-Pass Method Accurately Estimates Group Total Energy and Nutrient Intake. *The Journal of Nutrition*, 136(10), 2594–2599. <https://doi.org/10.1093/jn/136.10.2594>
- Blayney, M. J., & Tentori, F. (2009). Trends and Consequences of Mineral Bone Disorder in Haemodialysis Patients: Lessons from the Dialysis Outcomes and Practice Patterns Study (dopps). *Journal of Renal Care*, 35(s1), 7–13. <https://doi.org/10.1111/j.1755-6686.2009.00048.x>
- Block, G., Wakimoto, P., & Block, T. (1998). A revision of the Block Dietary Questionnaire and database, based on NHANES III data. *American Journal of Epidemiology*, 1–4.
- Block, G., Wakimoto, P., Jensen, C., Mandel, S., & Green, R. R. (2006). Validation of a food frequency questionnaire for Hispanics. *Preventing Chronic Disease*, 3(3), A77–A77.
- Block, Gladys, Hartman, A. M., Dresser, C. M., Carroll, M. D., Gannon, J., & Gardner, L. (1986). A Data-Based Approach to Diet Questionnaire Design and Testing. *American Journal of Epidemiology*, 124(3), 453–469. <https://doi.org/10.1093/oxfordjournals.aje.a114416>
- Bonanni, A., Mannucci, I., Verzola, D., Sofia, A., Saffioti, S., Gianetta, E., & Garibotto, G. (2011). Protein-Energy Wasting and Mortality in Chronic Kidney Disease. *International Journal of Environmental Research and Public Health*, 8(5), 1631–1654. <https://doi.org/10.3390/ijerph8051631>
- Boon, N. A., Colledge, N. R., Walker, B. R., & Hunter, J. A. A. (2006). *Davidson's Principles and Practice of Medicine* (20th Ed.). Churchill Livingstone.
- Bossola, M., Di Stasio, E., Viola, A., Cenerelli, S., Leo, A., Santarelli, S., & Monteburini, T. (2020). Dietary Daily Sodium Intake Lower than 1500 mg Is Associated with Inadequately Low Intake of Calorie, Protein, Iron, Zinc and Vitamin B1 in Patients on Chronic Hemodialysis. *Nutrients*, 12(1), 260. <https://doi.org/10.3390/nu12010260>
- Bossola, M., Di Stasio, E., Viola, A., Leo, A., Carlomagno, G., Monteburini, T., Cenerelli, S., Santarelli, S., Boggi, R., Miggiano, G., Vulpio, C., Mele, C., & Tazza, L. (2014). Dietary intake of trace elements, minerals, and vitamins of patients on chronic hemodialysis. *International Urology and Nephrology*, 46(4), 809–815. <https://doi.org/10.1007/s11255-014-0689-y>
- Bovio, G., Esposito, C., Montagna, G., Brazzo, S., Esposito, V., Torreggiani, M., Semeraro, L., & Cena, H. (2016). Inadequate Macronutrient and Micronutrient Intakes in Hemodialysis and Peritoneal Dialysis Patients: Data from a Seven-Day Weighed Dietary Record. *Nephron*, 133(4), 253–260. <https://doi.org/10.1159/000447723>
- Bowman, G. L., Shannon, J., Ho, E., Traber, M. G., Frei, B., Oken, B. S., Kaye, J. A., & Quinn, J. F. (2011). Reliability and Validity of Food Frequency Questionnaire and Nutrient Biomarkers in Elders With and Without Mild Cognitive Impairment. *Alzheimer Disease and Associated Disorders*, 25(1), 49–57. <https://doi.org/10.1097/WAD.0b013e3181f333d6>

- Brunner, E., Stallone, D., Juneja, M., Bingham, S., & Marmot, M. (2001). Dietary assessment in Whitehall II: Comparison of 7 d diet diary and food-frequency questionnaire and validity against biomarkers. *The British Journal of Nutrition*, 86(3), 405–414. <https://doi.org/10.1079/bjn2001414>
- Brunner, Eric, Stallone, D., Juneja, M., Bingham, S., & Marmot, M. (2001). Dietary assessment in Whitehall II: Comparison of 7 d diet diary and food-frequency questionnaire and validity against biomarkers. *British Journal of Nutrition*, 86(03), 405. <https://doi.org/10.1079/BJN2001414>
- Buch-Andersen, T., Pérez-Cueto, F. J. A., & Toft, U. (2016). Relative validity and reproducibility of a parent-administered semi-quantitative FFQ for assessing food intake in Danish children aged 3-9 years. *Public Health Nutrition*, 19(7), 1184–1194. <https://doi.org/10.1017/S136898001500275X>
- Budziareck, M. B., Pureza Duarte, R. R., & Barbosa-Silva, M. C. G. (2008). Reference values and determinants for handgrip strength in healthy subjects. *Clinical Nutrition*, 27(3), 357–362. <https://doi.org/10.1016/j.clnu.2008.03.008>
- Bull, B. S. H. P., Prchal, J. T. K. K., Lichman, M. A., Kipps, T. J., & Seligsohn, U. (2010). Morphology of the Erythron. In *Williams Hematology* (8th Ed.). McGraw-Hill.
- Burke, B. S. (1947). The dietary history as a tool in research. *Journal of the American Dietetic Association*, 23, 1041–1046.
- Burkholder-Cooley, N. M., Rajaram, S. S., Haddad, E. H., Oda, K., Fraser, G. E., & Jaceldo-Siegl, K. (2017). Validating polyphenol intake estimates from a food-frequency questionnaire by using repeated 24-h dietary recalls and a unique method-of-triads approach with 2 biomarkers. *The American Journal of Clinical Nutrition*, 105(3), 685–694. <https://doi.org/10.3945/ajcn.116.137174>
- Burmeister, J. E., Miltersteiner, D. da R., Burmeister, B. O., Campos, J. F., Burmeister, J. E., Miltersteiner, D. da R., Burmeister, B. O., & Campos, J. F. (2015). Risk of hypoglycemia during hemodialysis in diabetic patients is related to lower pre-dialysis glycemia. *Archives of Endocrinology and Metabolism*, 59(2), 137–140. <https://doi.org/10.1590/2359-3997000000026>
- Burrowes, J. D., Cockram, D. B., Dwyer, J. T., Larive, B., Paranandi, L., Bergen, C., & Poole, D. (2002). Cross-sectional relationship between dietary protein and energy intake, nutritional status, functional status, and comorbidity in older versus younger hemodialysis patients. *Journal of Renal Nutrition*, 12(2), 87–95. <https://doi.org/10.1053/jren.2002.32209>
- Burrowes, J. D., Larive, B., Cockram, D. B., Dwyer, J., Kusek, J. W., McLeroy, S., Poole, D., & Rocco, M. V. (2003). Effects of dietary intake, appetite, and eating habits on dialysis and non-dialysis treatment days in hemodialysis patients: Cross-sectional results From the HEMO study. *Journal of Renal Nutrition*, 13(3), 191–198. [https://doi.org/10.1016/S1051-2276\(03\)00069-4](https://doi.org/10.1016/S1051-2276(03)00069-4)
- Burrowes, J. D., Powers, S. N., Cockram, D. B., McLeroy, S. L., Dwyer, J. T., Cunniff, P. J., Paranandi, L., & Kusek, J. W. (1996). Use of an appetite and diet assessment tool in the pilot phase of a hemodialysis clinical trial: Mortality and morbidity in hemodialysis study. *Journal of Renal Nutrition*, 6(4), 229–232. [https://doi.org/10.1016/S1051-2276\(96\)90071-0](https://doi.org/10.1016/S1051-2276(96)90071-0)
- Buscemi, S., Rosafio, G., Vasto, S., Massenti, F. M., Grosso, G., Galvano, F., Rini, N., Barile, A. M., Maniaci, V., Cosentino, L., & Verga, S. (2015). Validation of a food frequency questionnaire for use in Italian adults living in Sicily. *International Journal of Food Sciences and Nutrition*, 66(4), 426–438. <https://doi.org/10.3109/09637486.2015.1025718>

- Busher, J. T. (1990). Serum Albumin and Globulin. In H. K. Walker, W. D. Hall, & J. W. Hurst (Eds.), *Clinical Methods: The History, Physical, and Laboratory Examinations* (3rd ed.). Butterworths. <http://www.ncbi.nlm.nih.gov/books/NBK204/>
- Butani, L., Polinsky, M. S., Kaiser, B. A., & Baluarte, H. J. (2002). Dietary protein intake significantly affects the serum creatinine concentration. *Kidney International*, *61*(5), 1907. <https://doi.org/10.1046/j.1523-1755.2002.00342.x>
- Butera, P. C. (2010). Estradiol and the control of food intake. *Physiology & Behavior*, *99*(2), 175–180. <https://doi.org/10.1016/j.physbeh.2009.06.010>
- Butler, P. J., Green, J. A., Boyd, I. L., & Speakman, J. R. (2004). Measuring metabolic rate in the field: The pros and cons of the doubly labelled water and heart rate methods. *Functional Ecology*, *18*(2), 168–183. <https://doi.org/10.1111/j.0269-8463.2004.00821.x>
- Cabezas-Rodriguez, I., Carrero, J. J., Zoccali, C., Qureshi, A. R., Ketteler, M., Floege, J., London, G., Locatelli, F., Gorriz, J. L., Rutkowski, B., Memmos, D., Ferreira, A., Covic, A., Teplan, V., Bos, W.-J., Kramar, R., Pavlovic, D., Goldsmith, D., Nagy, J., ... Cannata-Andia, J. B. (2013). Influence of body mass index on the association of weight changes with mortality in hemodialysis patients. *Clinical Journal of the American Society of Nephrology: CJASN*, *8*(10), 1725–1733. <https://doi.org/10.2215/CJN.10951012>
- Cade, J. E., Burley, V. J., Warm, D. L., Thompson, R. L., & Margetts, B. M. (2004). Food-frequency questionnaires: A review of their design, validation and utilisation. *Nutrition Research Reviews*, *17*(1), 5–22. <https://doi.org/10.1079/NRR200370>
- Cade, J., Thompson, R., Burley, V., & Warm, D. (2002). Development, validation and utilisation of food-frequency questionnaires – a review. *Public Health Nutrition*, *5*(4), 567–587. <https://doi.org/10.1079/PHN2001318>
- Cardoso, M. A., Kida, A. A., Tomita, L. Y., & Stocco, P. R. (2001). Reproducibility and validity of a food frequency questionnaire among women of Japanese ancestry living in Brazil. *Nutrition Research*, *21*(5), 725–733. [https://doi.org/10.1016/S0271-5317\(01\)00283-4](https://doi.org/10.1016/S0271-5317(01)00283-4)
- Carrero, J. J., Stenvinkel, P., Cuppari, L., Ikizler, T. A., Kalantar-Zadeh, K., Kaysen, G., Mitch, W. E., Price, S. R., Wanner, C., Wang, A. Y. M., ter Wee, P., & Franch, H. A. (2013). Etiology of the Protein-Energy Wasting Syndrome in Chronic Kidney Disease: A Consensus Statement From the International Society of Renal Nutrition and Metabolism (ISRNM). *Journal of Renal Nutrition*, *23*(2), 77–90. <https://doi.org/10.1053/j.jrn.2013.01.001>
- Chan, Y. M., Shariff, Z. M., Christopher, L. T. S., & Goh, B. L. (2019). Factors Associated With Poor Nutritional Status Among Hemodialysis Patients in Malaysia. *Malaysian Journal of Medicine and Health Sciences*, *15*(SP1), 77–83.
- Charlton, K. E., Steyn, K., Levitt, N. S., Jonathan, D., Zulu, J. V., & Nel, J. H. (2008). Development and validation of a short questionnaire to assess sodium intake. *Public Health Nutrition*, *11*(1), 83–94. <https://doi.org/10.1017/S1368980007000146>
- Charra, B. (2007). Fluid balance, dry weight, and blood pressure in dialysis. *Hemodialysis International*, *11*(1), 21–31. <https://doi.org/10.1111/j.1542-4758.2007.00148.x>
- Chazot, C., Wabel, P., Chamney, P., Moissl, U., Wieskotten, S., & Wizemann, V. (2012). Importance of normohydration for the long-term survival of haemodialysis

- patients. *Nephrology Dialysis Transplantation*, 27(6), 2404–2410. <https://doi.org/10.1093/ndt/gfr678>
- Chee, W., Suriah, A., Zaitun, Y., Chan, S., Yap, S., & Chan, Y. (2002). Dietary calcium intake in postmenopausal Malaysian women: Comparison between the food frequency questionnaire and three-day food records. *Asia Pacific Journal of Clinical Nutrition*, 11(2), 142–146. <https://doi.org/10.1046/j.1440-6047.2002.00276.x>
- Chen, J., Peng, H., Yuan, Z., Zhang, K., Xiao, L., Huang, J., Wang, J., & Huang, H. (2013). Combination with Anthropometric Measurements and MQSGA to Assess Nutritional Status in Chinese Hemodialysis Population. *International Journal of Medical Sciences*, 10(8), 974–980. <https://doi.org/10.7150/ijms.5811>
- Chen, J., Peng, H., Zhang, K., Xiao, L., Yuan, Z., Chen, J., Wang, Z., Wang, J., & Huang, H. (2013). The Insufficiency Intake of Dietary Micronutrients Associated with Malnutrition-Inflammation Score in Hemodialysis Population. *PLOS ONE*, 8(6), e66841. <https://doi.org/10.1371/journal.pone.0066841>
- Chen, J.-L., Lee, M.-C., & Kuo, H.-C. (2012). Reduction of cystometric bladder capacity and bladder compliance with time in patients with end-stage renal disease. *Journal of the Formosan Medical Association*, 111(4), 209–213. <https://doi.org/10.1016/j.jfma.2011.09.023>
- Chen, L., He, J.-X., Chen, Y.-Y., Ling, Y.-S., Lin, C.-H., & Guan, T.-J. (2018). Intensified treatment of hyperphosphatemia associated with reduction in parathyroid hormone in patients on maintenance hemodialysis. *Renal Failure*, 40(1), 15–21. <https://doi.org/10.1080/0886022X.2017.1419966>
- Chen, N.-C., Hsu, C.-Y., & Chen, C.-L. (2017). *The Strategy to Prevent and Regress the Vascular Calcification in Dialysis Patients* [Research article]. BioMed Research International. <https://doi.org/10.1155/2017/9035193>
- Chen, Y., Ahsan, H., Parvez, F., & Howe, G. R. (2004). Validity of a food-frequency questionnaire for a large prospective cohort study in Bangladesh. *British Journal of Nutrition*, 92(05), 851. <https://doi.org/10.1079/BJN20041277>
- Chinnock, A. (2006). Validation of an estimated food record. *Public Health Nutrition*, 9(7), 934–941. <https://doi.org/10.1017/PHN2005922>
- Chmielewski, M., Verduijn, M., Drechsler, C., Lindholm, B., Stenvinkel, P., Rutkowski, B., Boeschoten, E. W., Krediet, R. T., & Dekker, F. W. (2011). Low cholesterol in dialysis patients—Causal factor for mortality or an effect of confounding? *Nephrology, Dialysis, Transplantation*, 26(10), 3325–3331. <https://doi.org/10.1093/ndt/gfr008>
- Contento, I. R. (2011). *Nutrition Education: Linking research, theory and practice* (2nd Edition). Jones and Bartlett Publishers.
- Cook, D. A., & Beckman, T. J. (2006). Current Concepts in Validity and Reliability for Psychometric Instruments: Theory and Application. *The American Journal of Medicine*, 119(2), 166.e7-166.e16. <https://doi.org/10.1016/j.amjmed.2005.10.036>
- Courville, A. B., Bernstein, S., Cruz, M. G.-D. L., Onuzuruike, A., Matthan, N. R., Lichtenstein, A. H., Sumner, A. E., & Chung, S. T. (2018). Comparison of Dietary Fat Intake Using Food Records vs. RBC Fatty Acid Biomarkers in a Multiethnic Population—The Federal Women Study. *Diabetes*, 67(Supplement 1), 1893-P. <https://doi.org/10.2337/db18-1893-P>
- Cupisti, A., D'Alessandro, C., Valeri, A., Capitanini, A., Meola, M., Betti, G., & Barsotti, G. (2010). Food intake and nutritional status in stable hemodialysis

- patients. *Renal Failure*, 32(1), 47–54. <https://doi.org/10.3109/08860220903391234>
- Cupisti, Adamasco, D'Alessandro, C., Baldi, R., & Barsotti, G. (2004). Dietary habits and counseling focused on phosphate intake in hemodialysis patients with hyperphosphatemia. *Journal of Renal Nutrition*, 14(4), 220–225. <https://doi.org/10.1053/j.jrn.2004.07.006>
- D'Alessandro, C., Piccoli, G. B., & Cupisti, A. (2015). The “phosphorus pyramid”: A visual tool for dietary phosphate management in dialysis and CKD patients. *BMC Nephrology*, 16(1), 9. <https://doi.org/10.1186/1471-2369-16-9>
- Daugirdas, J. T., Depner, T. A., Inrig, J., Mehrotra, R., Rocco, M. V., Suri, R. S., Weiner, D. E., Greer, N., Ishani, A., MacDonald, R., Olson, C., Rutks, I., Slinin, Y., Wilt, T. J., Rocco, M., Kramer, H., Choi, M. J., Samaniego-Picota, M., Scheel, P. J., ... Brereton, L. (2015). KDOQI Clinical Practice Guideline for Hemodialysis Adequacy: 2015 Update. *American Journal of Kidney Diseases*, 66(5), 884–930. <https://doi.org/10.1053/j.ajkd.2015.07.015>
- Davidson, L., Vistisen, B., & Astrup, A. (2007). Impact of the menstrual cycle on determinants of energy balance: A putative role in weight loss attempts. *International Journal of Obesity*, 31(12), 1777–1785. <https://doi.org/10.1038/sj.ijo.0803699>
- de Vries, J., Antoine, J.-M., Burzykowski, T., Chiodini, A., Gibney, M., Kuhnle, G., Méheust, A., Pijls, L., & Rowland, I. (2013). Markers for nutrition studies: Review of criteria for the evaluation of markers. *European Journal of Nutrition*, 52(7), 1685–1699. <https://doi.org/10.1007/s00394-013-0553-3>
- de Winter, J. C. F., Gosling, S. D., & Potter, J. (2016). Comparing the Pearson and Spearman correlation coefficients across distributions and sample sizes: A tutorial using simulations and empirical data. *Psychological Methods*, 21(3), 273–290. <https://doi.org/10.1037/met0000079>
- Dehghan, M., Akhtar-Danesh, N., McMillan, C. R., & Thabane, L. (2007). Is plasma vitamin C an appropriate biomarker of vitamin C intake? A systematic review and meta-analysis. *Nutrition Journal*, 6(1), 41. <https://doi.org/10.1186/1475-2891-6-41>
- Dehghan, M., López Jaramillo, P., Dueñas, R., Anaya, L. L., Garcia, R. G., Zhang, X., Islam, S., & Merchant, A. T. (2012). Development and validation of a quantitative food frequency questionnaire among rural- and urban-dwelling adults in Colombia. *Journal of Nutrition Education and Behavior*, 44(6), 609–613. <https://doi.org/10.1016/j.jneb.2010.10.001>
- Delgado, C., Ward, P., Chertow, G. M., Storer, L., Dalrymple, L., Block, T., Kaysen, G. A., Kornak, J., Grimes, B., Kutner, N. G., & Johansen, K. L. (2014). Calibration of the Brief Food Frequency Questionnaire Among Patients on Dialysis. *Journal of Renal Nutrition*, 24(3), 151–156.e1. <https://doi.org/10.1053/j.jrn.2013.12.004>
- Denova-Gutiérrez, E., Ramírez-Silva, I., Rodríguez-Ramírez, S., Jiménez-Aguilar, A., Shamah-Levy, T., & Rivera-Dommarco, J. A. (2016). Validity of a food frequency questionnaire to assess food intake in Mexican adolescent and adult population. *Salud Publica De Mexico*, 58(6), 617–628. <https://doi.org/10.21149/spm.v58i6.7862>
- Department of Statistics Malaysia. (2017). Report of Household Income and Basic Amenities Survey 2016. https://www.dosm.gov.my/v1/index.php?r=column/cthemByCat&cat=120&bul_id=RUZ5REwveU1ra1hGL21JWVIPRmU2Zz09&menu_id=amVoWU54UT10a21NWmdhMjFMMWcyZz09

- DeSimone, J. A., Beauchamp, G. K., Drewnowski, A., & Johnson, G. H. (2013). Sodium in the food supply: Challenges and opportunities. *Nutrition Reviews*, *71*(1), 52–59. <https://doi.org/10.1111/nure.12006>
- Deurenberg-Yap, M., Li, T., Tan, W. L., van Staveren, W. A., & Deurenberg, P. (2000). Validation of a semiquantitative food frequency questionnaire for estimation of intakes of energy, fats and cholesterol among Singaporeans. *Asia Pacific Journal of Clinical Nutrition*, *9*(4), 282–288.
- Di Noia, J., Contento, I. R., & Schinke, S. P. (2007). Criterion Validity of the Healthy Eating Self-Monitoring Tool (HEST) for Black Adolescents. *Journal of the American Dietetic Association*, *107*(2), 321–324. <https://doi.org/10.1016/j.jada.2006.11.015>
- Djekic-Ivankovic, M., Weiler, H. A., Nikolic, M., Kadvan, A., Gurinovic, M., Mandic, L. M., & Glibetic, M. (2016). Validity of an FFQ assessing the vitamin D intake of young Serbian women living in a region without food fortification: The method of triads model. *Public Health Nutrition*, *19*(03), 437–445. <https://doi.org/10.1017/S136898001500138X>
- Doğan, N. Ö. (2018). Bland-Altman analysis: A paradigm to understand correlation and agreement. *Turkish Journal of Emergency Medicine*, *18*(4), 139–141. <https://doi.org/10.1016/j.tjem.2018.09.001>
- Dragsted, L. O., Gao, Q., Scalbert, A., Vergères, G., Kolehmainen, M., Manach, C., Brennan, L., Afman, L. A., Wishart, D. S., Andres Lacueva, C., Garcia-Aloy, M., Verhagen, H., Feskens, E. J. M., & Praticò, G. (2018). Validation of biomarkers of food intake—Critical assessment of candidate biomarkers. *Genes & Nutrition*, *13*. <https://doi.org/10.1186/s12263-018-0603-9>
- Dragsted, Lars O. (2010). Biomarkers of meat intake and the application of nutrigenomics. *Meat Science*, *84*(2), 301–307. <https://doi.org/10.1016/j.meatsci.2009.08.028>
- Drüeke, T. (2001). Hyporesponsiveness to recombinant human erythropoietin. *Nephrology Dialysis Transplantation*, *16 Suppl 7*, 25–28. https://doi.org/10.1093/ndt/16.suppl_7.25
- Duong, T. V., Wong, T.-C., Su, C.-T., Chen, H.-H., Chen, T.-W., Chen, T.-H., Hsu, Y.-H., Peng, S.-J., Kuo, K.-L., Liu, H.-C., Lin, E.-T., & Yang, S.-H. (2018). Associations of dietary macronutrients and micronutrients with the traditional and nontraditional risk factors for cardiovascular disease among hemodialysis patients: A clinical cross-sectional study. *Medicine*, *97*(26), e11306. <https://doi.org/10.1097/MD.0000000000011306>
- Dwyer, J. T., Cunniff, P. J., Maroni, B. J., Kopple, J. D., Burrowes, J. D., Powers, S. N., Cockram, D. B., Chumlea, W. C., Kusek, J. W., Makoff, R., Goldstein, D. J., & Paranandi, L. (1998). The hemodialysis pilot study: Nutrition program and participant characteristics at baseline. *Journal of Renal Nutrition*, *8*(1), 11–20. [https://doi.org/10.1016/S1051-2276\(98\)90032-2](https://doi.org/10.1016/S1051-2276(98)90032-2)
- Ekinci, C., Karabork, M., Sırıopol, D., Dincer, N., Covic, A., & Kanbay, M. (2018). Effects of Volume Overload and Current Techniques for the Assessment of Fluid Status in Patients with Renal Disease. *Blood Purification*, *46*(1), 34–47. <https://doi.org/10.1159/000487702>
- Eng, J. Y., & Moy, F. M. (2011). Validation of a food frequency questionnaire to assess dietary cholesterol, total fat and different types of fat intakes among Malay adults. *Asia Pacific Journal of Clinical Nutrition*, *20*(4), 639–645.
- Eriguchi, R., Obi, Y., Rhee, C. M., Kim, T. H., Soohoo, M., Stretja, E., & Kalantar-Zadeh, K. (2016). Associations of Dietary Protein Intake With Serum Albumin

- Level in Hemodialysis Patients. *American Journal of Kidney Diseases*, 67(5), A44. <https://doi.org/10.1053/j.ajkd.2016.03.108>
- Erkkola, M., Karppinen, M., Javanainen, J., Räsänen, L., Knip, M., & Virtanen, S. M. (2001). Validity and Reproducibility of a Food Frequency Questionnaire for Pregnant Finnish Women. *American Journal of Epidemiology*, 154(5), 466–476. <https://doi.org/10.1093/aje/154.5.466>
- ESRD Incidence Study Group, Stewart, J. H., McCredie, M. R. E., & Williams, S. M. (2006). Geographic, ethnic, age-related and temporal variation in the incidence of end-stage renal disease in Europe, Canada and the Asia-Pacific region, 1998–2002. *Nephrology, Dialysis, Transplantation*, 21(8), 2178–2183. <https://doi.org/10.1093/ndt/gfl145>
- Essadik, R., Msaad, R., Lebrazi, H., Taki, H., Tahri, E. H., Kettani, A., Madkouri, G., Ramdani, B., & Saïle, R. (2017). Assessing the prevalence of protein-energy wasting in haemodialysis patients: A cross-sectional monocentric study. *Néphrologie & Thérapeutique*, 13(7), 537–543. <https://doi.org/10.1016/j.nephro.2017.02.013>
- Eyberg, C. J., Pettifor, J. M., & Moodley, G. (1986). Dietary calcium intake in rural black South African children. The relationship between calcium intake and calcium nutritional status. *Human Nutrition. Clinical Nutrition*, 40(1), 69–74.
- Facchini, F. S. P. Y., & Dixon, B. (1997). ESRD patients consume an atherogenic diet. *J Am Soc Nephrol*, 7(S133), (abstr A1079, suppl 1).
- Fagerland, M. W. (2012). t-tests, non-parametric tests, and large studies—A paradox of statistical practice? *BMC Medical Research Methodology*, 12(1), 78. <https://doi.org/10.1186/1471-2288-12-78>
- Fallaize, R., Forster, H., Macready, A. L., Walsh, M. C., Mathers, J. C., Brennan, L., Gibney, E. R., Gibney, M. J., & Lovegrove, J. A. (2014). Online Dietary Intake Estimation: Reproducibility and Validity of the Food4Me Food Frequency Questionnaire Against a 4-Day Weighed Food Record. *Journal of Medical Internet Research*, 16(8). <https://doi.org/10.2196/jmir.3355>
- FAO. (2018). *Dietary Assessment: A resource guide to method selection and application in low resource settings*. <http://www.fao.org/3/i9940en/i9940EN.pdf>
- Farukuoye, M., Strassburger, K., Kacerovsky-Bielesz, G., Giani, G., & Roden, M. (2014). Validity and reproducibility of an interviewer-administered food frequency questionnaire in Austrian adults at risk of or with overt diabetes mellitus. *Nutrition Research*, 34(5), 410–419. <https://doi.org/10.1016/j.nutres.2014.04.004>
- Fatihah, F., Ng, B. K., Hazwanie, H., Norimah, A. K., Shanita, S. N., Ruzita, A. T., & Poh, B. K. (2015). Development and validation of a food frequency questionnaire for dietary intake assessment among multi-ethnic primary school-aged children. *Singapore Medical Journal*, 56(12), 687–694. <https://doi.org/10.11622/smedj.2015190>
- Fernandez, A. R., Omar, S. Z., & Husain, R. (2013). Development and validation of a food frequency questionnaire to estimate the intake of genistein in Malaysia. *International Journal of Food Sciences and Nutrition*, 64(7), 794–800. <https://doi.org/10.3109/09637486.2013.798269>
- Ferreira-Sae, M.-C. S., Gallani, M.-C. B., Nadruz, W., Rodrigues, R. C., Franchini, K. G., Cabral, P. C., & Sales, M. L. (2009). Reliability and validity of a semi-quantitative FFQ for sodium intake in low-income and low-literacy Brazilian hypertensive subjects. *Public Health Nutrition*, 12(11), 2168. <https://doi.org/10.1017/S1368980009005825>

- Fisher, J. O., Mitchell, D. C., Smiciklas-Wright, H., & Birch, L. L. (2002). Parental influences on young girls' fruit and vegetable, micronutrient, and fat intakes. *Journal of the American Dietetic Association, 102*(1), 58–64.
- Forouhi, N. G., Misra, A., Mohan, V., Taylor, R., & Yancy, W. (2018). Dietary and nutritional approaches for prevention and management of type 2 diabetes. *BMJ, 361*, k2234. <https://doi.org/10.1136/bmj.k2234>
- Forster, H., Fallaize, R., Gallagher, C., O'Donovan, C. B., Woolhead, C., Walsh, M. C., Macready, A. L., Lovegrove, J. A., Mathers, J. C., Gibney, M. J., Brennan, L., & Gibney, E. R. (2014). Online Dietary Intake Estimation: The Food4Me Food Frequency Questionnaire. *Journal of Medical Internet Research, 16*(6), e150. <https://doi.org/10.2196/jmir.3105>
- Fouque, D., Kalantar-Zadeh, K., Kopple, J., Cano, N., Chauveau, P., Cuppari, L., Franch, H., Guarnieri, G., Ikizler, T. A., Kaysen, G., Lindholm, B., Massy, Z., Mitch, W., Pineda, E., Stenvinkel, P., Trevinho-Becerra, A., & Wanner, C. (2008). A proposed nomenclature and diagnostic criteria for protein–energy wasting in acute and chronic kidney disease. *Kidney International, 73*(4), 391–398. <https://doi.org/10.1038/sj.ki.5002585>
- Fouque, Denis, Vennegoor, M., ter Wee, P., Wanner, C., Basci, A., Canaud, B., Haage, P., Konner, K., Kooman, J., Martin-Malo, A., Pedrini, L., Pizzarelli, F., Tattersall, J., Tordoir, J., & Vanholder, R. (2007). EBPG guideline on nutrition. *Nephrology, Dialysis, Transplantation, 22*(2), ii45-87. <https://doi.org/10.1093/ndt/gfm020>
- Freedman, L. S., Midthune, D., Carroll, R. J., Tasevska, N., Schatzkin, A., Mares, J., Tinker, L., Potischman, N., & Kipnis, V. (2011). Using Regression Calibration Equations That Combine Self-Reported Intake and Biomarker Measures to Obtain Unbiased Estimates and More Powerful Tests of Dietary Associations. *American Journal of Epidemiology, 174*(11), 1238–1245. <https://doi.org/10.1093/aje/kwr248>
- Garagarza, C., Valente, A., Caetano, C., Oliveira, T., Ponce, P., & Silva, A. P. (2017). Hypophosphatemia: Nutritional status, body composition, and mortality in hemodialysis patients. *International Urology and Nephrology, 49*(7), 1243–1250. <https://doi.org/10.1007/s11255-017-1558-2>
- Garrow, J. S., & Webster, J. (1985). Quetelet's index (W/H²) as a measure of fatness. *International Journal of Obesity, 9*(2), 147–153.
- Gemming, L., Jiang, Y., Swinburn, B., Utter, J., & Mhurchu, C. N. (2014). Under-reporting remains a key limitation of self-reported dietary intake: An analysis of the 2008/09 New Zealand Adult Nutrition Survey. *European Journal of Clinical Nutrition, 68*(2), 259–264. <https://doi.org/10.1038/ejcn.2013.242>
- George, G. C., Milani, T. J., Hanss-Nuss, H., Kim, M., & Freeland-Graves, J. H. (2004). Development and validation of a semi-quantitative food frequency questionnaire for young adult women in the southwestern United States. *Nutrition Research, 24*(1), 29–43. <https://doi.org/10.1016/j.nutres.2003.09.006>
- Ghazali, A., Goh, B., Lim, Y. N., Ong, L. M., & Lee, D. G. (2016). *Twenty Fourth Report of the Malaysian Dialysis and Transplant Registry*. National Renal Registry.
- Giavarina, D. (2015). Understanding Bland Altman analysis. *Biochimica Medica, 25*(2), 141–151. <https://doi.org/10.11613/BM.2015.015>
- Gibson, R. S. (2005). *Principles of Nutritional Assessment* (Second Edition). Oxford University Press.
- Gibson, R. S., Charrondiere, U. R., & Bell, W. (2017). Measurement Errors in Dietary Assessment Using Self-Reported 24-Hour Recalls in Low-Income Countries

- and Strategies for Their Prevention. *Advances in Nutrition*, 8(6), 980–991. <https://doi.org/10.3945/an.117.016980>
- Gibson, R. S., & Ferguson, E. L. (2008). *An interactive 24-hour recall for assessing the adequacy of iron and zinc intakes in developing countries*. HarvestPlus.
- Goletzke, J., Buyken, A. E., Louie, J. C. Y., Moses, R. G., & Brand-Miller, J. C. (2015). Dietary micronutrient intake during pregnancy is a function of carbohydrate quality. *The American Journal of Clinical Nutrition*, 102(3), 626–632. <https://doi.org/10.3945/ajcn.114.104836>
- González-Parra, E., Gracia-Iguacel, C., Egido, J., & Ortiz, A. (2012). Phosphorus and Nutrition in Chronic Kidney Disease. *International Journal of Nephrology*, 2012, 1–5. <http://dx.doi.org/10.1155/2012/597605>
- Goodwin, L. D., & Leech, N. L. (2006). Understanding Correlation: Factors That Affect the Size of r. *The Journal of Experimental Education*, 74(3), 249–266. <https://doi.org/10.3200/JEXE.74.3.249-266>
- Goulet, J., Nadeau, G., Lapointe, A., Lamarche, B., & Lemieux, S. (2004). Validity and reproducibility of an interviewer-administered food frequency questionnaire for healthy French-Canadian men and women. *Nutrition Journal*, 3, 13. <https://doi.org/10.1186/1475-2891-3-13>
- Greenfield, H., & Southgate, D. (2003). *Food Composition Data Production, Management and Use* (2nd Edition). Food and Agricultural Organization of the United Nations.
- Guallar-Castillón, P., Sagardui-Villamor, J., Balboa-Castillo, T., Sala-Vila, A., Astolfi, M. J. A., Pelous, M. D. S., León-Muñoz, L. M., Graciani, A., Laclaustra, M., Benito, C., Banegas, J. R., & Artalejo, F. R. (2014). Validity and Reproducibility of a Spanish Dietary History. *PLOS ONE*, 9(1), e86074. <https://doi.org/10.1371/journal.pone.0086074>
- Gumz, M. L., Rabinowitz, L., & Wingo, C. S. (2015). An Integrated View of Potassium Homeostasis. *The New England Journal of Medicine*, 373(1), 60–72. <https://doi.org/10.1056/NEJMra1313341>
- Hacker-Thompson, A., Schloetter, M., & Sellmeyer, D. E. (2012). Validation of a Dietary Vitamin D Questionnaire Using Multiple Diet Records and the Block 98 Health Habits and History Questionnaire in Healthy Postmenopausal Women in Northern California. *Journal of the Academy of Nutrition and Dietetics*, 112(3), 419–423. <https://doi.org/10.1016/j.jada.2011.08.043>
- Haftenberger, M., Heuer, T., Heidemann, C., Kube, F., Krems, C., & Mensink, G. B. (2010). Relative validation of a food frequency questionnaire for national health and nutrition monitoring. *Nutrition Journal*, 9(1). <https://doi.org/10.1186/1475-2891-9-36>
- Hamer, M., McNaughton, S. A., Bates, C. J., & Mishra, G. D. (2010). Dietary patterns, assessed from a weighed food record and survival among elderly participants from the United Kingdom. *European Journal of Clinical Nutrition*, 64(8), 853–861. <https://doi.org/10.1038/ejcn.2010.93>
- Hand, R. K., Steiber, A., & Burrowes, J. (2013). Renal dietitians lack time and resources to follow the NKF KDOQI guidelines for frequency and method of diet assessment: Results of a survey. *Journal of Renal Nutrition*, 23(6), 445–449. <https://doi.org/10.1053/j.jrn.2012.08.010>
- Harray, A. J., Boushey, C. J., Pollard, C. M., Delp, E. J., Ahmad, Z., Dhaliwal, S. S., Mukhtar, S. A., & Kerr, D. A. (2015). A Novel Dietary Assessment Method to Measure a Healthy and Sustainable Diet Using the Mobile Food Record: Protocol and Methodology. *Nutrients*, 7(7), 5375–5395. <https://doi.org/10.3390/nu7075226>

- Harris, J. A., & Benedict, F. G. (1919). *A biometric study of basal metabolism in man*. Washington Carnegie Institution of Washington. <http://archive.org/details/biometricstudyof00harruoft>
- Harvinder, G. S., Chee, W. S. S., Karupaiah, T., Sahathevan, S., Chinna, K., Ghazali, A., Bavanandan, S., & Goh, B. L. (2013). Comparison of malnutrition prevalence between haemodialysis and continuous ambulatory peritoneal dialysis patients: A cross-sectional study. *Malaysian Journal of Nutrition*, 19(3), 271–283.
- Harvinder, G. S., Swee, W. C. S., Karupaiah, T., Sahathevan, S., Chinna, K., Ahmad, G., Bavanandan, S., & Goh, B. L. (2016). Dialysis malnutrition and malnutrition inflammation scores: Screening tools for prediction of dialysis - related protein-energy wasting in Malaysia. *Asia Pacific Journal of Clinical Nutrition*, 25(1), 26–33. <https://doi.org/10.6133/apjcn.2016.25.1.01>
- Haynes, S. N., Richard, D. C. S., & Kubany, E. S. (1995). Content validity in psychological assessment: A functional approach to concepts and methods. *Psychological Assessment*, 7(3), 238–247. <https://doi.org/10.1037/1040-3590.7.3.238>
- Haziqah, N. (2015). *Validation of Food Frequency Questionnaire Among Community Dwelling Older Adults* [Unpublished master dissertation]. Universiti Putra Malaysia.
- Hebden, L., Kostan, E., O’Leary, F., Hodge, A., & Allman-Farinelli, M. (2013). Validity and reproducibility of a food frequency questionnaire as a measure of recent dietary intake in young adults. *PloS One*, 8(9), e75156. <https://doi.org/10.1371/journal.pone.0075156>
- Hedrick, V. E., Dietrich, A. M., Estabrooks, P. A., Savla, J., Serrano, E., & Davy, B. M. (2012). Dietary biomarkers: Advances, limitations and future directions. *Nutrition Journal*, 11, 109. <https://doi.org/10.1186/1475-2891-11-109>
- Heng, Y. H. (2000). *Validity & Reliability of Short Food Frequency Questionnaire for use in Case Control Studies of Cataract* [Unpublished master dissertation]. Universiti Putra Malaysia.
- Henríquez-Sánchez, P., Sánchez-Villegas, A., Doreste-Alonso, J., Ortiz-Andrellucchi, A., Pfrimer, K., & Serra-Majem, L. (2009). Dietary assessment methods for micronutrient intake: A systematic review on vitamins. *The British Journal of Nutrition*, 102(Suppl 1), S10-37. <https://doi.org/10.1017/S0007114509993126>
- Henry Ford Health System. (2011). *Clinical Practice Recommendations for Primary Care Physicians and Healthcare Providers*. Divisions of Nephrology & Hypertension and General Internal Medicine. https://www.asn-online.org/education/training/fellows/HFHS_CKD_V6.pdf
- Heshmatollah, S., Abdorrahim, A., Taha, J. M., Farideh, M., Abbas, K. G., & Deris, Z. Z. (2018). Comparison of zinc, copper, selenium, magnesium, aluminium and lead blood concentrations in end-stage renal disease patients and healthy volunteers in Ahvaz, southwest of Iran. *Russian Open Medical Journal*, 7(1), Article 1. <https://cyberleninka.ru/article/n/comparison-of-zinc-copper-selenium-magnesium-aluminium-and-lead-blood-concentrations-in-end-stage-renal-disease-patients-and-healthy>
- Heuer, T., Krems, C., Moon, K., Brombach, C., & Hoffmann, I. (2015). Food consumption of adults in Germany: Results of the German National Nutrition Survey II based on diet history interviews. *British Journal of Nutrition*, 113(10), 1603–1614. <https://doi.org/10.1017/S0007114515000744>
- Higuchi, T., Abe, M., Mizuno, M., Yamazaki, T., Suzuki, H., Moriuchi, M., Oikawa, O., Okawa, E., Ando, H., & Okada, K. (2015). Association of restless legs syndrome with oxidative stress and inflammation in patients undergoing

- hemodialysis. *Sleep Medicine*, 16(8), 941–948. <https://doi.org/10.1016/j.sleep.2015.03.025>
- Ho, L., Wang, H.-H., Peng, Y.-S., Chiang, C.-K., Huang, J.-W., Hung, K.-Y., Hu, F.-C., & Wu, K.-D. (2008). Clinical Utility of Malnutrition-Inflammation Score in Maintenance Hemodialysis Patients: Focus on Identifying the Best Cut-Off Point. *American Journal of Nephrology*, 28(5), 840–846. <https://doi.org/10.1159/000137684>
- Hollingdale, R., Sutton, D., & Hart, K. (2008). Facilitating dietary change in renal disease: Investigating patients' perspectives. *Journal of Renal Care*, 34(3), 136–142. <https://doi.org/10.1111/j.1755-6686.2008.00034.x>
- Hopkins, W. G., Marshall, S. W., Batterham, A. M., & Hanin, J. (2009). Progressive statistics for studies in sports medicine and exercise science. *Medicine and Science in Sports and Exercise*, 41(1), 3–13. <https://doi.org/10.1249/MSS.0b013e31818cb278>
- Hsu, C.-Y., Chertow, G. M., & Curhan, G. C. (2002). Methodological issues in studying the epidemiology of mild to moderate chronic renal insufficiency. *Kidney International*, 61(5), 1567–1576. <https://doi.org/10.1046/j.1523-1755.2002.00299.x>
- Huang, C. X., Tighiouart, H., Beddhu, S., Cheung, A. K., Dwyer, J. T., Eknoyan, G., Beck, G. J., Levey, A. S., & Sarnak, M. J. (2010). Both low muscle mass and low fat are associated with higher all-cause mortality in hemodialysis patients. *Kidney International*, 77(7), 624–629. <https://doi.org/10.1038/ki.2009.524>
- Hulley, S. B., Cummings, S. R., Browner, W. S., Grady, D. G., & Newman, T. B. (2013). *Designing Clinical Research* (4th ed.). Lippincott Williams & Wilkins.
- Illner, A.-K., Freisling, H., Boeing, H., Huybrechts, I., Crispim, S. P., & Slimani, N. (2012). Review and evaluation of innovative technologies for measuring diet in nutritional epidemiology. *International Journal of Epidemiology*, 41(4), 1187–1203. <https://doi.org/10.1093/ije/dys105>
- Institute for Public Health. (2014). *National health and morbidity survey 2014: Malaysian adults nutrition survey (MANS)*. Institute for Public Health.
- Institute of Medicine (US) Committee. (2002). *Dietary Risk Assessment in the WIC Program*. National Academies Press (US). <https://www.ncbi.nlm.nih.gov/books/NBK220560/>
- Isa, Z. M., Shamsuddin, K., Bukhary, I. B. N., Khor, G. L., Mahdy, Z. A., Haslinda, H., Hana, Y. N. S., & Faisal, G. H. (2015). Development and validation of a food frequency questionnaire for vitamin D intake among urban pregnant women in Malaysia. *Malaysian Journal of Nutrition*, 21(2), 179–190.
- Jackson, M. D., Walker, S. P., Younger, N. M., & Bennett, F. I. (2011). Use of a food frequency questionnaire to assess diets of Jamaican adults: Validation and correlation with biomarkers. *Nutrition Journal*, 10, 28. <https://doi.org/10.1186/1475-2891-10-28>
- Jain, N., Kotla, S., Little, B. B., Weideman, R. A., Brilakis, E. S., Reilly, R. F., & Banerjee, S. (2012). Predictors of Hyperkalemia and Death in Patients With Cardiac and Renal Disease. *American Journal of Cardiology*, 109(10), 1510–1513. <https://doi.org/10.1016/j.amjcard.2012.01.367>
- Jakovenko, A. A., & Romyantsev, A. S. (2019). The prevalence of protein-energy wasting in haemodialysis patients. *Nephrology and Dialysis*, 21(1), 66–71. <https://doi.org/10.28996/2618-9801-2019-1-66-71>
- Janardhan, V., Soundararajan, P., Rani, N. V., Kannan, G., Thennarasu, P., Chacko, R. A., & Reddy, C. U. M. (2011). Prediction of Malnutrition Using Modified Subjective Global Assessment-dialysis Malnutrition Score in Patients on

- Hemodialysis. *Indian Journal of Pharmaceutical Sciences*, 73(1), 38–45. <https://doi.org/10.4103/0250-474X.89755>
- Jankowska, M., Rutkowski, B., & Dębska-Ślizień, A. (2017). Vitamins and Microelement Bioavailability in Different Stages of Chronic Kidney Disease. *Nutrients*, 9(3), 282. <https://doi.org/10.3390/nu9030282>
- Jędrusik, P., Symonides, B., Wojciechowska, E., Gryglas, A., & Gaciong, Z. (2017). Diagnostic value of potassium level in a spot urine sample as an index of 24-hour urinary potassium excretion in unselected patients hospitalized in a hypertension unit. *PLoS ONE*, 12(6). <https://doi.org/10.1371/journal.pone.0180117>
- Jenab, M., Slimani, N., Bictash, M., Ferrari, P., & Bingham, S. A. (2009). Biomarkers in nutritional epidemiology: Applications, needs and new horizons. *Human Genetics*, 125(5–6), 507–525. <https://doi.org/10.1007/s00439-009-0662-5>
- Jialin, W., Yi, Z., & Weijie, Y. (2012). Relationship between body mass index and mortality in hemodialysis patients: A meta-analysis. *Nephron. Clinical Practice*, 121(3–4), c102–111. <https://doi.org/10.1159/000345159>
- Jiang, Z., Zhang, X., Yang, L., Li, Z., & Qin, W. (2016). Effect of restricted protein diet supplemented with keto analogues in chronic kidney disease: A systematic review and meta-analysis. *International Urology and Nephrology*, 48(3), 409–418. <https://doi.org/10.1007/s11255-015-1170-2>
- Jung, H. J., Lee, S. E., Kim, D., Noh, H., Song, S., Kang, M., Song, Y. J., & Paik, H.-Y. (2015). Improvement in the Technological Feasibility of a Web-based Dietary Survey System in Local Settings. *Asia Pacific Journal of Clinical Nutrition*, 24(2), 308–315. <https://doi.org/10.6133/apjcn.2015.24.2.20>
- Juraschek, S. P., Appel, L. J., Anderson, C. A. M., & Miller, E. R. (2013). Effect of a High-Protein Diet on Kidney Function in Healthy Adults: Results From the OmniHeart Trial. *American Journal of Kidney Diseases*, 61(4), 547–554. <https://doi.org/10.1053/j.ajkd.2012.10.017>
- Kaaks, R., Ferrari, P., Ciampi, A., Plummer, M., & Riboli, E. (2002). Uses and limitations of statistical accounting for random error correlations, in the validation of dietary questionnaire assessments. *Public Health Nutrition*, 5(6a), 969–976. <https://doi.org/10.1079/PHN2002380>
- Kalantar-Zadeh, K., & Fouque, D. (2017). Nutritional Management of Chronic Kidney Disease. *New England Journal of Medicine*, 377(18), 1765–1776. <https://doi.org/10.1056/NEJMra1700312>
- Kalantar-Zadeh, K., Gutekunst, L., Mehrotra, R., Kovesdy, C. P., Bross, R., Shinaberger, C. S., Noori, N., Hirschberg, R., Benner, D., Nissenson, A. R., & Kopple, J. D. (2010). Understanding sources of dietary phosphorus in the treatment of patients with chronic kidney disease. *Clinical Journal of the American Society of Nephrology: CJASN*, 5(3), 519–530. <https://doi.org/10.2215/CJN.06080809>
- Kalantar-Zadeh, K., & Kopple, J. D. (2003). Trace elements and vitamins in maintenance dialysis patients. *Advances in Renal Replacement Therapy*, 10(3), 170–182.
- Kalantar-Zadeh, K., Kopple, J. D., Block, G., & Humphreys, M. H. (2001). A Malnutrition-Inflammation Score is correlated with morbidity and mortality in maintenance hemodialysis patients. *American Journal of Kidney Diseases*, 38(6), 1251–1263. <https://doi.org/10.1053/ajkd.2001.29222>
- Kalantar-Zadeh, K., Kopple, J. D., Deepak, S., Block, D., & Block, G. (2002). Food intake characteristics of hemodialysis patients as obtained by food frequency questionnaire. *Journal of Renal Nutrition: The Official Journal of the Council on Renal Nutrition of the National Kidney Foundation*, 12(1), 17–31.

- Kalantar-Zadeh, K., Kovesdy, C. P., Bross, R., Benner, D., Noori, N., Murali, S. B., Block, T., Norris, J., Kopple, J. D., & Block, G. (2011). Design and Development of a Dialysis Food Frequency Questionnaire. *Journal of Renal Nutrition*, 21(3), 257–262. <https://doi.org/10.1053/j.jrn.2010.05.013>
- Kalantar-Zadeh, K., Regidor, D. L., Kovesdy, C. P., Van Wyck, D., Bunnapradist, S., Horwich, T. B., & Fonarow, G. C. (2009). Fluid retention is associated with cardiovascular mortality in patients undergoing long-term hemodialysis. *Circulation*, 119(5), 671–679. <https://doi.org/10.1161/CIRCULATIONAHA.108.807362>
- Kalantar-Zadeh, K., Tortorici, A. R., Chen, J. L. T., Kamgar, M., Lau, W.-L., Moradi, H., Rhee, C. M., Streja, E., & Kovesdy, C. P. (2015). Dietary Restrictions in Dialysis Patients: Is There Anything Left to Eat? *Seminars in Dialysis*, 28(2), 159–168. <https://doi.org/10.1111/sdi.12348>
- Kanazawa, Y., Nakao, T., Murai, S., Okada, T., & Matsumoto, H. (2017). Diagnosis and prevalence of protein-energy wasting and its association with mortality in Japanese haemodialysis patients. *Nephrology*, 22(7), 541–547. <https://doi.org/10.1111/nep.12814>
- Kang, S. S., Chang, J. W., & Park, Y. (2017). Nutritional Status Predicts 10-Year Mortality in Patients with End-Stage Renal Disease on Hemodialysis. *Nutrients*, 9(4), 399. <https://doi.org/10.3390/nu9040399>
- Kapsokefalou, M., Roe, M., Turrini, A., Costa, H. S., Martinez-Victoria, E., Marletta, L., Berry, R., & Finglas, P. (2019). Food Composition at Present: New Challenges. *Nutrients*, 11(8), 1714. <https://doi.org/10.3390/nu11081714>
- Kaur, S., Yusof, B. N. M., Yim, H. S., Mohamed, H. J., & Jalil, R. (2016). Validation and Reproducibility of a Culturally Specific Food Frequency Questionnaire (FFQ) for Malaysian Punjabis. *Malaysian Journal of Nutrition*, 22(2), 245–255.
- Kaykcioglu, M., Tumuklu, M., Ozkahya, M., Ozdogan, O., Asci, G., Duman, S., Toz, H., Can, L. H., Basci, A., & Ok, E. (2009). The benefit of salt restriction in the treatment of end-stage renal disease by haemodialysis. *Nephrology, Dialysis, Transplantation: Official Publication of the European Dialysis and Transplant Association - European Renal Association*, 24(3), 956–962. <https://doi.org/10.1093/ndt/gfn599>
- KDIGO. (2017). Clinical Practice Guideline Update for the Diagnosis, Evaluation, Prevention, and Treatment of Chronic Kidney Disease–Mineral and Bone Disorder (CKD-MBD). *Journal of International Society of Nephrology*, 7(1), 60.
- K/DOQI. (2005). K/DOQI clinical practice guidelines for cardiovascular disease in dialysis patients. *American Journal of Kidney Diseases*, 45(4 Suppl 3), S1-153.
- KDOQI. (2007). KDOQI Clinical Practice Guideline and Clinical Practice Recommendations for anemia in chronic kidney disease: 2007 update of hemoglobin target. *American Journal of Kidney Diseases*, 50(3), 471–530. <https://doi.org/10.1053/j.ajkd.2007.06.008>
- K/DOQI, N. K. F. (2000). Clinical Practice Guideline. *American Journal of Kidney Diseases*, 35(6), S1–S140. <https://doi.org/doi:10.1053/kd.2000.6669>
- K/DOQI, N. K. F. (2003). Clinical practice guidelines for bone metabolism and disease in chronic kidney disease. *American Journal of Kidney Diseases: The Official Journal of the National Kidney Foundation*, 42(4 Suppl 3), S1-201. [https://doi.org/DOI:https://doi.org/10.1016/S0272-6386\(03\)00905-3](https://doi.org/DOI:https://doi.org/10.1016/S0272-6386(03)00905-3)
- Kelemen, L. E., Anand, S. S., Vuksan, V., Yi, Q., Teo, K. K., Devanesen, S., & Yusuf, S. (2003). Development and evaluation of cultural food frequency questionnaires for South Asians, Chinese, and Europeans in North America.

- Journal of the American Dietetic Association*, 103(9), 1178–1184. [https://doi.org/10.1016/S0002-8223\(03\)00985-4](https://doi.org/10.1016/S0002-8223(03)00985-4)
- Kelishadi, R., Majdzadeh, R., Motlagh, M.-E., Heshmat, R., Aminae, T., Ardalan, G., Esmailzadeh, A., Azadbakht, L., Poursafa, P., Movahedian, M., & Baraz, S. (2012). Development and Evaluation of a Questionnaire for Assessment of Determinants of Weight Disorders among Children and Adolescents: The Caspian-IV Study. *International Journal of Preventive Medicine*, 3(10), 699–705.
- Kerr, D. A., Schap, T. E., & Johnson, R. K. (2013). Chapter 7—Analysis, Presentation, and Interpretation of Dietary Data. In A. M. Coulston, C. J. Boushey, & M. G. Ferruzzi (Eds.), *Nutrition in the Prevention and Treatment of Disease (Third Edition)* (pp. 125–140). Academic Press. <https://doi.org/10.1016/B978-0-12-391884-0.00007-X>
- Kho, M., Lee, J. E., Song, Y.-M., Lee, K., Kim, K., Yang, S., Joung, H., & Sung, J. (2013). Genetic and environmental influences on sodium intake determined by using half-day urine samples: The Healthy Twin Study. *The American Journal of Clinical Nutrition*, 98(6), 1410–1416. <https://doi.org/10.3945/ajcn.113.067967>
- Khor, B.-H., Chinna, K., Abdul Gafar, A. H., Morad, Z., Ahmad, G., Bavanandam, S., Visvanathan, R., Yahya, R., Goh, B.-L., Bee, B.-C., & Karupaiah, T. (2018). The state of nutrition care in outpatient hemodialysis settings in Malaysia: A nationwide survey. *BMC Health Services Research*, 18. <https://doi.org/10.1186/s12913-018-3702-9>
- Khor, S. M., Goh, A. W. L., & Chong, C. P. (2020). EVALUATION OF DIETARY PROTEIN AND PHOSPHATE INTAKE AMONG THE HEMODIALYSIS PATIENTS WITH HYPERPHOSPHATEMIA IN PENANG, MALAYSIA. *Malaysian Journal of Medical Research*, 4(1), 1–8.
- Khoueiry, G., Waked, A., Goldman, M., El-Charabaty, E., Dunne, E., Smith, M., Kleiner, M., Lafferty, J., Kalantar-Zadeh, K., & El-Sayegh, S. (2011). Dietary Intake in Hemodialysis Patients Does Not Reflect a Heart Healthy Diet. *Journal of Renal Nutrition*, 21(6), 438–447. <https://doi.org/10.1053/j.jrn.2010.09.001>
- Kiely, M., Collins, A., Lucey, A. J., Andersen, R., Cashman, K. D., & Hennessy, Á. (2016). Development, validation and implementation of a quantitative food frequency questionnaire to assess habitual vitamin D intake. *Journal of Human Nutrition and Dietetics*, 29(4), 495–504. <https://doi.org/10.1111/jhn.12348>
- Kikunaga, S., Tin, T., Ishibashi, G., Wang, D.-H., & Kira, S. (2007). The Application of a Handheld Personal Digital Assistant with Camera and Mobile Phone Card (Wellnavi) to the General Population in a Dietary Survey. *Journal of Nutritional Science and Vitaminology*, 53(2), 109–116. <https://doi.org/10.3177/jnsv.53.109>
- Kim, M. K., & Youl Choi, B. (2002). The influence of portion size data on the agreement of classification of individuals according to nutrient estimates by food frequency questionnaire in a rural area of Korea. *Nutrition Research*, 22(3), 271–281. [https://doi.org/10.1016/S0271-5317\(01\)00375-X](https://doi.org/10.1016/S0271-5317(01)00375-X)
- Kim, S.-M., Kang, B. C., Kim, H.-J., Kyung, M.-S., Oh, H. J., Kim, J.-H., Kwon, O., & Ryu, D.-R. (2020). Comparison of hemodialysis and peritoneal dialysis patients' dietary behaviors. *BMC Nephrology*, 21(1), 91. <https://doi.org/10.1186/s12882-020-01744-6>
- Kim, Y.-J., Kim, O. Y., Cho, Y., Chung, J. H., Jung, Y.-S., Hwang, G.-S., & Shin, M.-J. (2012). Plasma phospholipid fatty acid composition in ischemic stroke: Importance of docosahexaenoic acid in the risk for intracranial atherosclerotic

- stenosis. *Atherosclerosis*, 225(2), 418–424. <https://doi.org/10.1016/j.atherosclerosis.2012.09.007>
- Kizil, M., Tengilimoglu-Metin, M. M., Gumus, D., Sevim, S., Turkoglu, İ., & Mandiroglu, F. (2016). Dietary inflammatory index is associated with serum C-reactive protein and protein energy wasting in hemodialysis patients: A cross-sectional study. *Nutrition Research and Practice*, 10(4), 404–410. <https://doi.org/10.4162/nrp.2016.10.4.404>
- Kjaergaard, K. D., Jensen, J. D., Peters, C. D., & Jespersen, B. (2011). Preserving residual renal function in dialysis patients: An update on evidence to assist clinical decision making. *NDT Plus*, 4(4), 225. <https://doi.org/10.1093/ndtplus/sfr035>
- Kloppenborg, W. D., Stegeman, C. A., Hooyshuur, M., van der Ven, J., de Jong, P. E., & Huisman, R. M. (1999). Assessing dialysis adequacy and dietary intake in the individual hemodialysis patient. *Kidney International*, 55(5), 1961–1969. <https://doi.org/10.1046/j.1523-1755.1999.00412.x>
- Kobayashi, S., Honda, S., Murakami, K., Sasaki, S., Okubo, H., Hirota, N., Notsu, A., Fukui, M., & Date, C. (2012). Both Comprehensive and Brief Self-Administered Diet History Questionnaires Satisfactorily Rank Nutrient Intakes in Japanese Adults. *Journal of Epidemiology*, 22(2), 151–159. <https://doi.org/10.2188/jea.JE20110075>
- Kopple, J. D. (2001). National Kidney Foundation K/DOQI Clinical Practice Guidelines for Nutrition in Chronic Renal Failure. *American Journal of Kidney Diseases*, 37(1, Supplement 2), S66–S70. <https://doi.org/10.1053/ajkd.2001.20748>
- Kowalkowska, J., Slowinska, M. A., Slowinski, D., Dlugosz, A., Niedzwiedzka, E., & Wadolowska, L. (2013). Comparison of a Full Food-Frequency Questionnaire with the Three-Day Unweighted Food Records in Young Polish Adult Women: Implications for Dietary Assessment. *Nutrients*, 5(7), 2747–2776. <https://doi.org/10.3390/nu5072747>
- Krejcie, R. V., & Morgan, D. W. (1970). Determining Sample Size for Research Activities. *Educational and Psychological Measurement*, 30(3), 607–610. <https://doi.org/10.1177/001316447003000308>
- Kristal, A. R. (2005). Is It Time to Abandon the Food Frequency Questionnaire? *Cancer Epidemiology Biomarkers & Prevention*, 14(12), 2826–2828. <https://doi.org/10.1158/1055-9965.EPI-12-ED1>
- Kristal, Alan R., Kolar, A. S., Fisher, J. L., Plascak, J. J., Stumbo, P. J., Weiss, R., & Paskett, E. D. (2014). Evaluation of Web-Based, Self-Administered, Graphical Food Frequency Questionnaire. *Journal of the Academy of Nutrition and Dietetics*, 114(4), 613–621. <https://doi.org/10.1016/j.jand.2013.11.017>
- Kuhlmann, M., Schmidt, F., & Köhler, H. (1999). High Protein/Energy vs. Standard Protein/Energy Nutritional Regimen in the Treatment of Malnourished Hemodialysis Patients. *Mineral and Electrolyte Metabolism*, 25(4–6), 306–310. <https://doi.org/10.1159/000057465>
- Kvammen, J. A., Thomassen, R. A., Eskerud, M. B., Rugtveit, J., & Henriksen, C. (2018). Micronutrient Status and Nutritional Intake in 0- to 2-Year-old Children Consuming a Cows' Milk Exclusion Diet. *Journal of Pediatric Gastroenterology and Nutrition*, 66(5), 831–837. <https://doi.org/10.1097/MPG.0000000000001942>
- Lana, A., Rodríguez-Artalejo, F., & Lopez-Garcia, E. (2014). Consumption of Sugar-Sweetened Beverages Is Positively Related to Insulin Resistance and Higher Plasma Leptin Concentrations in Men and Nonoverweight Women. *The Journal of Nutrition*, 144(7), 1099–1105. <https://doi.org/10.3945/jn.114.195230>

- Lazarte, C. E., Encinas, M. E., Alegre, C., & Granfeldt, Y. (2012). Validation of digital photographs, as a tool in 24-h recall, for the improvement of dietary assessment among rural populations in developing countries. *Nutrition Journal*, *11*(1), 61. <https://doi.org/10.1186/1475-2891-11-61>
- Leal, V. O., Mafra, D., Fouque, D., & Anjos, L. A. (2011). Use of handgrip strength in the assessment of the muscle function of chronic kidney disease patients on dialysis: A systematic review. *Nephrology Dialysis Transplantation*, *26*(4), 1354–1360. <https://doi.org/10.1093/ndt/gfq487>
- Leal, V. O., Moraes, C., Stockler-Pinto, M. B., Lobo, J. C., Farage, N. E., Velarde, L. G., Fouque, D., & Mafra, D. (2012). Is a body mass index of 23 kg/m² a reliable marker of protein-energy wasting in hemodialysis patients? *Nutrition*, *28*(10), 973–977. <https://doi.org/10.1016/j.nut.2011.12.004>
- Lee, L. K., Shahar, S., Yusoff, N. A. M., & Chin, A. V. (2013). Validation of a food frequency questionnaire in assessing the omega-3 polyunsaturated fatty acids intake for Malays and Chinese elderly in Malaysia. *Sains Malaysiana*, *42*(11), 1625–1632.
- Lepsch, J., Vaz, J. S., Moreira, J. D., Pinto, T. J. P., Soares-Mota, M., & Kac, G. (2015). Food frequency questionnaire as an indicator of the serum composition of essential n-3 and n-6 polyunsaturated fatty acids in early pregnancy, according to body mass index. *Journal of Human Nutrition and Dietetics*, *28*(1), 85–94. <https://doi.org/10.1111/jhn.12225>
- Liang, X., Wang, W., & Li, H. (2013). Water and sodium restriction on cardiovascular disease in young chronic hemodialysis patients. *Chinese Medical Journal*, *126*(9), 1667–1672. <https://doi.org/10.3760/cma.j.issn.0366-6999.20130152>
- Lim, H.-S., Kim, H.-S., Kim, J. K., Park, M., & Choi, S. J. (2019). Nutritional Status and Dietary Management According to Hemodialysis Duration. *Clinical Nutrition Research*, *8*(1), 28–35. <https://doi.org/10.7762/cnr.2019.8.1.28>
- Lim, J. H., Lim, C. K. M., Ibrahim, I., Syahrul, J., Zakaria, N. F., & Daud, Z. A. M. (2019). Constraints of Dietetics Services in Malaysian Hemodialysis Care: Findings of a Nationwide Online Survey. *Unpublished Manuscript*.
- Liu, J., Tang, W., Chen, G., Lu, Y., Feng, C., & Tu, X. M. (2016). Correlation and agreement: Overview and clarification of competing concepts and measures. *Shanghai Archives of Psychiatry*, *28*(2), 115. <https://doi.org/10.11919/j.issn.1002-0829.216045>
- Liu, L., Wang, P. P., Roebathan, B., Ryan, A., Tucker, C. S., Colbourne, J., Baker, N., Cotterchio, M., Yi, Y., & Sun, G. (2013). Assessing the validity of a self-administered food-frequency questionnaire (FFQ) in the adult population of Newfoundland and Labrador, Canada. *Nutrition Journal*, *12*(1), 49. <https://doi.org/10.1186/1475-2891-12-49>
- Livingstone, M. B. E., Robson, P. J., & Wallace, J. M. W. (2004). Issues in dietary intake assessment of children and adolescents. *The British Journal of Nutrition*, *92*(Suppl 2), S213–222. <https://doi.org/10.1079/bjn20041169>
- Livingstone, M. Barbara E., & Black, A. E. (2003). Markers of the Validity of Reported Energy Intake. *The Journal of Nutrition*, *133*(3), 895S–920S. <https://doi.org/10.1093/jn/133.3.895S>
- Locatelli, F., Fouque, D., Heimburger, O., Drüeke, T. B., Cannata-Andía, J. B., Hörl, W. H., & Ritz, E. (2002). Nutritional status in dialysis patients: A European consensus. *Nephrology Dialysis Transplantation*, *17*(4), 563–572. <https://doi.org/10.1093/ndt/17.4.563>

- Locatelli, F., Pisoni, R. L., Combe, C., Bommer, J., Andreucci, V. E., Piera, L., Greenwood, R., Feldman, H. I., Port, F. K., & Held, P. J. (2004). Anaemia in haemodialysis patients of five European countries: Association with morbidity and mortality in the Dialysis Outcomes and Practice Patterns Study (DOPPS). *Nephrology Dialysis Transplantation*, 19(1), 121–132. <https://doi.org/10.1093/ndt/gfg458>
- Locatelli, F., Vecchio, L. D., Violo, L., & Pontoriero, G. (2014). Phosphate binders for the treatment of hyperphosphatemia in chronic kidney disease patients on dialysis: A comparison of safety profiles. *Expert Opinion on Drug Safety*, 13(5), 551–561. <https://doi.org/10.1517/14740338.2014.907791>
- Lombard, M. J., Steyn, N. P., Charlton, K. E., & Senekal, M. (2015). Application and interpretation of multiple statistical tests to evaluate validity of dietary intake assessment methods. *Nutrition Journal*, 14(1). <https://doi.org/10.1186/s12937-015-0027-y>
- Lora, K. R., Lewis, N. M., Eskridge, K. M., Stanek-Krogstrand, K., & Ritter-Gooder, P. (2010). Validity and reliability of an omega-3 fatty acid food frequency questionnaire for first-generation Midwestern Latinas. *Nutrition Research*, 30(8), 550–557. <https://doi.org/10.1016/j.nutres.2010.07.007>
- Lorenzo, V., Martín, M., Rufino, M., Jiménez, A., Malo, A. M., Sanchez, E., Hernández, D., Rodríguez, M., & Torres, A. (2001). Protein intake, control of serum phosphorus, and relatively low levels of parathyroid hormone in elderly hemodialysis patients. *American Journal of Kidney Diseases: The Official Journal of the National Kidney Foundation*, 37(6), 1260–1266.
- Loy, S. L., Marhazlina, M., Nor, A. Y., & Hamid, J. J. M. (2011). Development, validity and reproducibility of a food frequency questionnaire in pregnancy for the Universiti Sains Malaysia birth cohort study. *Malaysian Journal of Nutrition*, 17(1), 1–18.
- Luis, D., Zlatkis, K., Comenge, B., García, Z., Navarro, J. F., Lorenzo, V., & Carrero, J. J. (2016). Dietary Quality and Adherence to Dietary Recommendations in Patients Undergoing Hemodialysis. *Journal of Renal Nutrition*, 26(3), 190–195. <https://doi.org/10.1053/j.jrn.2015.11.004>
- Lynch, K. E., Lynch, R., Curhan, G. C., & Brunelli, S. M. (2011). Prescribed dietary phosphate restriction and survival among hemodialysis patients. *Clinical Journal of the American Society of Nephrology: CJASN*, 6(3), 620–629. <https://doi.org/10.2215/CJN.04620510>
- Macdougall, I. C., Bircher, A. J., Eckardt, K.-U., Obrador, G. T., Pollock, C. A., Stenvinkel, P., Swinkels, D. W., Wanner, C., Weiss, G., Chertow, G. M., Adamson, J. W., Akizawa, T., Anker, S. D., Auerbach, M., Bárány, P., Besarab, A., Bhandari, S., Cabantchik, I., Collins, A. J., ... Zakharova, E. (2016). Iron management in chronic kidney disease: Conclusions from a “Kidney Disease: Improving Global Outcomes” (KDIGO) Controversies Conference. *Kidney International*, 89(1), 28–39. <https://doi.org/10.1016/j.kint.2015.10.002>
- MacIntyre, U., Venter, C., & Vorster, H. (2001). A culture-sensitive quantitative food frequency questionnaire used in an African population: 1. Development and reproducibility. *Public Health Nutrition*, 4(1), 53–62. <https://doi.org/10.1079/PHN200040>
- Mafra, D., Moraes, C., Leal, V. O., Farage, N. E., Stockler-Pinto, M. B., & Fouque, D. (2012). Underreporting of Energy Intake in Maintenance Hemodialysis Patients: A Cross-sectional Study. *Journal of Renal Nutrition*, 22(6), 578–583. <https://doi.org/10.1053/j.jrn.2011.10.037>

- Mahabir, S., Baer, D. J., Giffen, C., Subar, A., Campbell, W., Hartman, T. J., Clevidence, B., Albanes, D., & Taylor, P. R. (2006). Calorie intake misreporting by diet record and food frequency questionnaire compared to doubly labeled water among postmenopausal women. *European Journal of Clinical Nutrition*, 60(4), 561–565. <https://doi.org/10.1038/sj.ejcn.1602359>
- Malaysian Dietitians Association. (2005). *Medical Nutrition Therapy Guidelines for Chronic Kidney Disease*. http://www.dietitians.org.my/sites/default/files/webmaster/Dietetic%20Practise%20Guidelines/MDA2005_MNT-Guidelines-CKD.pdf
- Malekahmadi, M., Naeini, A. A., Shab-Bidar, S., Feizi, A., & Djazayeri, A. (2016). Development, validity, and reliability of a food frequency questionnaire for antioxidants in elderly Iranian people. *Journal of Research in Medical Sciences*, 21. <https://doi.org/10.4103/1735-1995.178753>
- Maniam, R., Subramanian, P., Singh, S., Lim, S., Chinna, K., & Rosli, R. (2014). Preliminary study of an exercise programme for reducing fatigue and improving sleep among long-term haemodialysis patients. *Singapore Medical Journal*, 55(09), 476–482. <https://doi.org/10.11622/smedj.2014119>
- Manippa, V., Padulo, C., van der Laan, L. N., & Brancucci, A. (2017). Gender Differences in Food Choice: Effects of Superior Temporal Sulcus Stimulation. *Frontiers in Human Neuroscience*, 11. <https://doi.org/10.3389/fnhum.2017.00597>
- Mansour, A., Ahadi, Z., Qorbani, M., & Hosseini, S. (2014). Association between dietary intake and seasonal variations in postmenopausal women. *Journal of Diabetes and Metabolic Disorders*, 13, 52. <https://doi.org/10.1186/2251-6581-13-52>
- Maraj, M., Kuśnierz-Cabala, B., Dumnicka, P., Gala-Błądzińska, A., Gawlik, K., Pawlica-Gosiewska, D., Ząbek-Adamska, A., Mazur-Laskowska, M., Ceranowicz, P., & Kuźniewski, M. (2018). Malnutrition, Inflammation, Atherosclerosis Syndrome (MIA) and Diet Recommendations among End-Stage Renal Disease Patients Treated with Maintenance Hemodialysis. *Nutrients*, 10(1), 69. <https://doi.org/10.3390/nu10010069>
- Mardani, M., Rezapour, P., Baba, H., Balavar, S., & Naghdi, N. (2016). The nutritional status of hemodialysis patients admitted to Khoramabad's Shohadie Ashaier hospital, Korramabad, Iran. *Journal of Preventive Epidemiology*, 1(1), e09–e09.
- Margetts, B., & Nelson, M. (2010). *Design Concepts in Nutritional Epidemiology: Vol. 2nd Edition*. Oxford Medical Publications.
- Martin, D. R., Ritter, C. S., Slatopolsky, E., & Brown, A. J. (2005). Acute regulation of parathyroid hormone by dietary phosphate. *American Journal of Physiology-Endocrinology and Metabolism*, 289(4), E729–E734. <https://doi.org/10.1152/ajpendo.00065.2005>
- Martín-del-Campo, F., Batis-Ruvalcaba, C., González-Espinoza, L., Rojas-Campos, E., Ángel, J. R., Ruiz, N., González, J., Pazarín, L., & Cueto-Manzano, A. M. (2012). Dietary Micronutrient Intake in Peritoneal Dialysis Patients: Relationship with Nutrition and Inflammation Status. *Peritoneal Dialysis International: Journal of the International Society for Peritoneal Dialysis*, 32(2), 183–191. <https://doi.org/10.3747/pdi.2010.00245>
- Martins, A. M., Dias Rodrigues, J. C., de Oliveira Santin, F. G., Barbosa Brito, F. dos S., Bello Moreira, A. S., Lourenço, R. A., & Avesani, C. M. (2015). Food Intake Assessment of Elderly Patients on Hemodialysis. *Journal of Renal Nutrition*, 25(3), 321–326. <https://doi.org/10.1053/j.jrn.2014.10.007>
- Mason, B., Ross, L., Gill, E., Healy, H., Juffs, P., & Kark, A. (2014). Development and validation of a dietary screening tool for high sodium consumption in Australian

- renal patients. *Journal of Renal Nutrition: The Official Journal of the Council on Renal Nutrition of the National Kidney Foundation*, 24(2), 123-134.e1-3. <https://doi.org/10.1053/j.jrn.2013.10.004>
- Masson, L. F., McNeill, G., Tomany, J. O., Simpson, J. A., Peace, H. S., Wei, L., Grubb, D. A., & Bolton-Smith, C. (2003). Statistical approaches for assessing the relative validity of a food-frequency questionnaire: Use of correlation coefficients and the kappa statistic. *Public Health Nutrition*, 6(3), 313–321. <https://doi.org/10.1079/PHN2002429>
- Mc Causland, F. R., Waikar, S. S., & Brunelli, S. M. (2012). Increased dietary sodium is independently associated with greater mortality among prevalent hemodialysis patients. *Kidney International*, 82(2), 204–211. <https://doi.org/10.1038/ki.2012.42>
- McKeag, N. A., McKinley, M. C., Harbinson, M. T., McGinty, A., Neville, C. E., Woodside, J. V., & McKeown, P. P. (2017). Dietary Micronutrient Intake and Micronutrient Status in Patients With Chronic Stable Heart Failure: An Observational Study. *The Journal of Cardiovascular Nursing*, 32(2), 148–155. <https://doi.org/10.1097/JCN.0000000000000322>
- McLean, R. M. (2014). Measuring Population Sodium Intake: A Review of Methods. *Nutrients*, 6(11), 4651–4662. <https://doi.org/10.3390/nu6114651>
- Mehrotra, S., Rishishwar, P., & Sharma, R. K. (2015). Malnutrition and hyperphosphatemia in dialysis patients. *Clinical Queries: Nephrology*, 4(3), 25–27. <https://doi.org/10.1016/j.cqn.2015.11.008>
- Mente, A., Dehghan, M., Rangarajan, S., McQueen, M., Dagenais, G., Wielgosz, A., Lear, S., Li, W., Chen, H., Yi, S., Wang, Y., Diaz, R., Avezum, A., Lopez-Jaramillo, P., Seron, P., Kumar, R., Gupta, R., Mohan, V., Swaminathan, S., ... Prospective Urban Rural Epidemiology (PURE) study investigators. (2017). Association of dietary nutrients with blood lipids and blood pressure in 18 countries: A cross-sectional analysis from the PURE study. *The Lancet. Diabetes & Endocrinology*, 5(10), 774–787. [https://doi.org/10.1016/S2213-8587\(17\)30283-8](https://doi.org/10.1016/S2213-8587(17)30283-8)
- Meyer, H. E., Johansson, L., Eggen, A. E., Johansen, H., & Holvik, K. (2019). Sodium and Potassium Intake Assessed by Spot and 24-h Urine in the Population-Based Tromsø Study 2015–2016. *Nutrients*, 11(7). <https://doi.org/10.3390/nu11071619>
- Mirnalini, K., Zalilah, M. S., Safiah, M. Y., Tahir, A., Siti Haslinda, M. D., Siti Rohana, D., Khairul Zarina, M. Y., Mohd Hasyami, S., & Normah, H. (2008). Energy and Nutrient Intakes: Findings from the Malaysian Adult Nutrition Survey (MANS). *Malaysian Journal of Nutrition*, 14(1), 1–24.
- Moghames, P., Hammami, N., Hwalla, N., Yazbeck, N., Shoaib, H., Nasreddine, L., & Naja, F. (2016). Validity and reliability of a food frequency questionnaire to estimate dietary intake among Lebanese children. *Nutrition Journal*, 15(4). <https://doi.org/10.1186/s12937-015-0121-1>
- Mohamed, K., Tin, T. S., Jalaludin, M. Y., Al-Sadat, N., & Majid, H. A. (2018). Comparative validity of a Food Frequency Questionnaire (MyUM Adolescent FFQ) to estimate the habitual dietary intake of adolescents in Malaysia. *Asia Pacific Journal of Clinical Nutrition*, 27(4), 898–907. <https://doi.org/10.6133/apjcn.022018.03>
- Molag, M. L., de Vries, J. H. M., Ocké, M. C., Dagnelie, P. C., van den Brandt, P. A., Jansen, M. C. J. F., van Staveren, W. A., & van't Veer, P. (2007). Design Characteristics of Food Frequency Questionnaires in Relation to Their Validity.

- American Journal of Epidemiology*, 166(12), 1468–1478. <https://doi.org/10.1093/aje/kwm236>
- Montford, J. R., & Linas, S. (2017). How Dangerous Is Hyperkalemia? *Journal of the American Society of Nephrology*, 28(11), 3155–3165. <https://doi.org/10.1681/ASN.2016121344>
- Morais, A. A. C., Silva, M. A. T., Faintuch, J., Vidigal, E. J., Costa, R. A., Lyrio, D. C., Trindade, C. R., & Pitanga, K. K. (2005). Correlation of nutritional status and food intake in hemodialysis patients. *Clinics*, 60(3), 185–192. <https://doi.org/10.1590/S1807-59322005000300002>
- Mueller, C., Compber, C., & Ellen, D. M. (2011). A.S.P.E.N. Clinical Guidelines. *Journal of Parenteral and Enteral Nutrition*, 35(1), 16–24. <https://doi.org/10.1177/0148607110389335>
- Muscaritoli, M., Molfino, A., Chiappini, M. G., Laviano, A., Ammann, T., Spinsanti, P., Melchiorri, D., Inui, A., Alegiani, F., & Fanelli, F. R. (2007). Anorexia in Hemodialysis Patients: The Possible Role of Des-Acyl Ghrelin. *American Journal of Nephrology*, 27(4), 360–365. <https://doi.org/10.1159/000103798>
- Na, Y. J., & Lee, S. H. (2012). Development and validation of a quantitative food frequency questionnaire to assess nutritional status in Korean adults. *Nutrition Research and Practice*, 6(5), 444–450. <https://doi.org/10.4162/nrp.2012.6.5.444>
- Nagahama, S., Yamagata, K., Saito, C., Takahashi, H., Seura, T., Higure, S., & Nakanishi, T. (2018). Dietary Nutrient Intake Assessment in Maintenance Hemodialysis Patients by Comparing Two Food Record Forms. *Journal of Nutritional Disorders & Therapy*, 8(2). <https://doi.org/10.4172/2161-0509.1000228>
- Nasri, H., Baradaran, A., Shirzad, H., & Rafeian-Kopaei, M. (2014). New Concepts in Nutraceuticals as Alternative for Pharmaceuticals. *International Journal of Preventive Medicine*, 5(12), 1487–1499.
- National Coordinating Committee on Food and Nutrition, M. O. H. (2017). *Recommended Nutrient Intakes for Malaysia: A Report of the Technical Working Group on Nutritional Guidelines* (No. 978-967-12050-4-4). <http://nutrition.moh.gov.my/wp-content/uploads/2017/05/FA-Buku-RNI.pdf>
- National Kidney Foundation. (2000). *NKF K/DOQI Guidelines. Appendix VII: methods for performing anthropometry and calculating body measurements and reference tables*. National Kidney Foundation. https://kidneyfoundation.cachefly.net/professionals/KDOQI/guidelines_nutrition/nut_appx07a.html
- National Kidney Foundation. (2002). K/DOQI Clinical Practice Guidelines for Chronic Kidney Disease: Evaluation, Classification and Stratification. *Am J Kidney*, 39, S1–S266.
- National Kidney Foundation. (2016). *Potassium and Your CKD Diet*. National Kidney Foundation. <https://www.kidney.org/atoz/content/potassium>
- National Kidney Foundation Malaysia. (2019). *Hemodialysis*. <https://nkf.org.my/kidney-transplant/hemodialysis/>
- Neelakantan, N., Whitton, C., Seah, S., Koh, H., Rebello, S. A., Lim, J. Y., Chen, S., Chan, M. F., Chew, L., & van Dam, R. M. (2016). Development of a Semi-Quantitative Food Frequency Questionnaire to Assess the Dietary Intake of a Multi-Ethnic Urban Asian Population. *Nutrients*, 8(9). <https://doi.org/10.3390/nu8090528>
- Nisha, R., Srinivasa, K. S. R., Thanga, M. K., & Jagatha, P. (2017). Biochemical evaluation of creatinine and urea in patients with renal failure undergoing

- hemodialysis. *Journal of Clinical Pathology and Laboratory Medicine*, 1(2). <http://www.alliedacademies.org/abstract/biochemical-evaluation-of-creatinine-and-urea-in-patients-with-renal-failure-undergoing-hemodialysis-8318.html>
- Noor Hafizah, Y., Ang, L. C., Yap, F., Nurul Najwa, W., Cheah, W. L., Ruzita, A. T., Jumuddin, F. A., Koh, D., Lee, J. A. C., Essau, C. A., Reeves, S., Summerbell, C., Leigh Gibson, E., & Poh, B. K. (2019). Validity and Reliability of a Food Frequency Questionnaire (FFQ) to Assess Dietary Intake of Preschool Children. *International Journal of Environmental Research and Public Health*, 16(23). <https://doi.org/10.3390/ijerph16234722>
- Noori, N., Kalantar-Zadeh, K., Kovesdy, C. P., Bross, R., Benner, D., & Kopple, J. D. (2010). Association of Dietary Phosphorus Intake and Phosphorus to Protein Ratio with Mortality in Hemodialysis Patients. *Clinical Journal of the American Society of Nephrology*, 5(4), 683–692. <https://doi.org/10.2215/CJN.08601209>
- Noori, N., Kalantar-Zadeh, K., Kovesdy, C. P., Murali, S. B., Bross, R., Nissenson, A. R., & Kopple, J. D. (2010). Dietary Potassium Intake and Mortality in Long-term Hemodialysis Patients. *American Journal of Kidney Diseases*, 56(2), 338–347. <https://doi.org/10.1053/j.ajkd.2010.03.022>
- Noori, Nazanin, Dukkupati, R., Kovesdy, C. P., Sim, J. J., Feroze, U., Murali, S. B., Bross, R., Benner, D., Kopple, J. D., & Kalantar-Zadeh, K. (2011). Dietary Omega-3 Fatty Acid, Ratio of Omega-6 to Omega-3 Intake, Inflammation, and Survival in Long-term Hemodialysis Patients. *American Journal of Kidney Diseases*, 58(2), 248–256. <https://doi.org/10.1053/j.ajkd.2011.03.017>
- Noori, Nazanin, Kopple, J. D., Kovesdy, C. P., Feroze, U., Sim, J. J., Murali, S. B., Luna, A., Gomez, M., Luna, C., Bross, R., Nissenson, A. R., & Kalantar-Zadeh, K. (2010). Mid-arm muscle circumference and quality of life and survival in maintenance hemodialysis patients. *Clinical Journal of the American Society of Nephrology: CJASN*, 5(12), 2258–2268. <https://doi.org/10.2215/CJN.02080310>
- Noori, Nazanin, Kovesdy, C. P., Dukkupati, R., Feroze, U., Molnar, M. Z., Bross, R., Nissenson, A. R., Kopple, J. D., Norris, K. C., & Kalantar-Zadeh, K. (2011). Racial and ethnic differences in mortality of hemodialysis patients: Role of dietary and nutritional status and inflammation. *American Journal of Nephrology*, 33(2), 157–167. <https://doi.org/10.1159/000323972>
- Noori, Nazanin, Kovesdy, C. P., Murali, S., Benner, D., Bross, R., Block, G., Kopple, J. D., & Kalantar-Zadeh, K. (2010). Dietary Assessment of Individuals with Chronic Kidney Disease. *Seminars in Dialysis*, 23(4), 359–364. <https://doi.org/10.1111/j.1525-139X.2010.00743.x>
- Norimah, A. K., Safiah, M., Jamal, K., Haslinda, S., Zuhaida, H., Rohida, S., Fatimah, S., Norazlin, S., Poh, B. K., Kandiah, M., Zalilah, M. S., Wan Manan, W. M., Fatimah, S., & Azmi, M. Y. (2008). Food Consumption Patterns: Findings from the Malaysian Adult Nutrition Survey (MANS). *Malaysian Journal of Nutrition*, 14(1), 25–39.
- Nurhidayah, M., Shahar, S., Ahmad, M., Azahadi, O. M., Hasnan, A. M., Ishak, I., & Manaf, Z. A. (2016). Validation of food frequency questionnaire in estimating Docosahexanoic Acids (DHA) intake among Malay primary school children. *Malaysian Journal of Nutrition*, 22(2), 233–243.
- Nurul-Fadhilah, A., Teo, P. S., & Foo, L. H. (2012). Validity and reproducibility of a food frequency questionnaire (FFQ) for dietary assessment in Malay adolescents in Malaysia. *Asia Pacific Journal of Clinical Nutrition*, 21(1), 97–103.

- Nybacka, S., Lindroos, A. K., Wirfält, E., Leanderson, P., Landberg, R., Ericson, U., Larsson, I., Warensjö Lemming, E., Bergström, G., Hedblad, B., Orholm-Melander, M., Melander, O., Winkvist, A., & Bertéus Forslund, H. (2016). Carotenoids and alkylresorcinols as objective biomarkers of diet quality when assessing the validity of a web-based food record tool and a food frequency questionnaire in a middle-aged population. *BMC Nutrition*, 2(1), 53. <https://doi.org/10.1186/s40795-016-0094-2>
- Obi, Y., Qader, H., Kovesdy, C. P., & Kalantar-Zadeh, K. (2015). Latest consensus and update on protein-energy wasting in chronic kidney disease: *Current Opinion in Clinical Nutrition and Metabolic Care*, 18(3), 254–262. <https://doi.org/10.1097/MCO.0000000000000171>
- O’Gorman, A., Gibbons, H., & Brennan, L. (2013). Metabolomics in the Identification of Biomarkers of Dietary Intake. *Computational and Structural Biotechnology Journal*, 4(5), e201301004. <https://doi.org/10.5936/csbj.201301004>
- Ortega, R. M., Pérez-Rodrigo, C., & López-Sobaler, A. M. (2015). Dietary assessment methods: Dietary records. *Nutricion Hospitalaria*, 31 Suppl 3, 38–45. <https://doi.org/10.3305/nh.2015.31.sup3.8749>
- Paes-Barreto, J. G., Silva, M. I. B., Qureshi, A. R., Bregman, R., Cervante, V. F., Carrero, J. J., & Avesani, C. M. (2013). Can renal nutrition education improve adherence to a low-protein diet in patients with stages 3 to 5 chronic kidney disease? *Journal of Renal Nutrition: The Official Journal of the Council on Renal Nutrition of the National Kidney Foundation*, 23(3), 164–171. <https://doi.org/10.1053/j.jrn.2012.10.004>
- Palacios, C., Trak, M. A., Betancourt, J., Joshipura, K., & Tucker, K. L. (2015). Validation and reproducibility of a semi-quantitative FFQ as a measure of dietary intake in adults from Puerto Rico. *Public Health Nutrition*, 18(14), 2550–2558. <https://doi.org/10.1017/S1368980014003218>
- Palmer, B. F., & Clegg, D. J. (2017). Diagnosis and treatment of hyperkalemia. *Cleveland Clinic Journal of Medicine*, 84(12), 934–942. <https://doi.org/10.3949/ccjm.84a.17056>
- Pandya, D., Nagrajappa, A. K., & Ravi, K. S. (2016). Assessment and Correlation of Urea and Creatinine Levels in Saliva and Serum of Patients with Chronic Kidney Disease, Diabetes and Hypertension– A Research Study. *Journal of Clinical and Diagnostic Research: JCDR*, 10(10), ZC58–ZC62. <https://doi.org/10.7860/JCDR/2016/20294.8651>
- Pani, A., Floris, M., Rosner, M. H., & Ronco, C. (2014). Hyperkalemia in Hemodialysis Patients. *Seminars in Dialysis*, 27(6), 571–576. <https://doi.org/10.1111/sdi.12272>
- Parham, W. A., Mehdiraz, A. A., Biermann, K. M., & Fredman, C. S. (2006). Hyperkalemia Revisited. *Texas Heart Institute Journal*, 33(1), 40–47.
- Park, J., Rhee, C. M., Sim, J. J., Kim, Y.-L., Ricks, J., Streja, E., Vashistha, T., Tolouian, R., Kovesdy, C. P., & Kalantar-Zadeh, K. (2013). A comparative effectiveness research study of the change in blood pressure during hemodialysis treatment and survival. *Kidney International*, 84(4), 795–802. <https://doi.org/10.1038/ki.2013.237>
- Patch, C. S., Tapsell, L. C., Mori, T. A., Meyer, B. J., Murphy, K. J., Mansour, J., Noakes, M., Clifton, P. M., Puddey, I. B., Beilin, L. J., Annison, G., & Howe, P. R. C. (2005). The use of novel foods enriched with long-chain n-3 fatty acids to increase dietary intake: A comparison of methodologies assessing nutrient intake. *Journal of the American Dietetic Association*, 105(12), 1918–1926. <https://doi.org/10.1016/j.jada.2005.09.001>

- Patel, M. G., Kitchen, S., & Miligan, P. J. (2000). The effect of dietary supplements on the nPCR in stable hemodialysis patients. *Journal of Renal Nutrition*, *10*(2), 69–75. [https://doi.org/10.1016/S1051-2276\(00\)90002-5](https://doi.org/10.1016/S1051-2276(00)90002-5)
- Pfister, R., Sharp, S. J., Luben, R., Wareham, N. J., & Khaw, K.-T. (2011). Plasma vitamin C predicts incident heart failure in men and women in European Prospective Investigation into Cancer and Nutrition–Norfolk prospective study. *American Heart Journal*, *162*(2), 246–253. <https://doi.org/10.1016/j.ahj.2011.05.007>
- Picó, C., Serra, F., Rodríguez, A. M., Keijer, J., & Palou, A. (2019). Biomarkers of Nutrition and Health: New Tools for New Approaches. *Nutrients*, *11*(5). <https://doi.org/10.3390/nu11051092>
- Poslusna, K., Ruprich, J., Vries, J. H. M. D., Jakubikova, M., & Veer, P. V. (2009). Misreporting of energy and micronutrient intake estimated by food records and 24 hour recalls, control and adjustment methods in practice. *British Journal of Nutrition*, *101*(S2), S73. <https://doi.org/10.1017/S0007114509990602>
- Potischman, N. (2003). Biologic and Methodologic Issues for Nutritional Biomarkers. *The Journal of Nutrition*, *133*(3), 875S–880S. <https://doi.org/10.1093/jn/133.3.875S>
- Probst, Y. C., & Tapsell, L. C. (2005). Overview of computerized dietary assessment programs for research and practice in nutrition education. *Journal of Nutrition Education and Behavior*, *37*(1), 20–26. [https://doi.org/10.1016/S1499-4046\(06\)60255-8](https://doi.org/10.1016/S1499-4046(06)60255-8)
- Pun, P. H., & Middleton, J. P. (2017). Dialysate Potassium, Dialysate Magnesium, and Hemodialysis Risk. *Journal of the American Society of Nephrology*, *28*(12), 3441–3451. <https://doi.org/10.1681/ASN.2017060640>
- Qato, D. M., Wilder, J., Schumm, L. P., Gillet, V., & Alexander, G. C. (2016). Changes in Prescription and Over-the-Counter Medication and Dietary Supplement Use Among Older Adults in the United States, 2005 vs 2011. *JAMA Internal Medicine*, *176*(4), 473–482. <https://doi.org/10.1001/jamainternmed.2015.8581>
- Rabbani, S. A., S, S. B., Rao, P. G., Kurian, M. T., & Essawy, B. E. (2017). HYPERPHOSPHATEMIA IN END STAGE RENAL DISEASE: PREVALENCE AND PATIENTS CHARACTERISTICS OF MULTIETHNIC POPULATION OF UNITED ARAB EMIRATES. *International Journal of Pharmacy and Pharmaceutical Sciences*, 283–287. <https://doi.org/10.22159/ijpps.2017v9i12.22425>
- Radjen, S., Ristic-Medic, D., Terzic, B., Djurovic, B., & Mijuskovic, M. (2018). Protein-energy wasting in maintenance hemodialysis patients—Etiology and diagnosis. *Vojnosanitetski Pregled*, *75*(4), 404–409. <https://doi.org/10.2298/VSP160902352R>
- Ramírez-Silva, I., Jiménez-Aguilar, A., Valenzuela-Bravo, D., Martínez-Tapia, B., Rodríguez-Ramírez, S., Gaona-Pineda, E. B., Angulo-Estrada, S., & Shamah-Levy, T. (2017). Methodology for estimating dietary data from the semi-quantitative food frequency questionnaire of the Mexican National Health and Nutrition Survey 2012. *Salud Pública de México*, *58*(6), 629–638.
- Rehman, I. U., Lai, P. S. M., Lim, S. K., Lee, L. H., & Khan, T. M. (2019). Sleep disturbance among Malaysian patients with end-stage renal disease with pruritus. *BMC Nephrology*, *20*(1), 102. <https://doi.org/10.1186/s12882-019-1294-1>
- Reid, D. J., Barr, S. I., & Leichter, J. (1992). Effects of folate and zinc supplementation on patients undergoing chronic hemodialysis. *Journal of the American Dietetic Association*, *92*(5), 574–579.

- Rennie, K. L., Coward, A., & Jebb, S. A. (2007). Estimating under-reporting of energy intake in dietary surveys using an individualised method. *British Journal of Nutrition*, 97(06), 1169. <https://doi.org/10.1017/S0007114507433086>
- Ricks, J., Molnar, M. Z., Kovesdy, C. P., Kopple, J. D., Norris, K. C., Mehrotra, R., Nissenson, A. R., Arah, O. A., Greenland, S., & Kalantar-Zadeh, K. (2011). Racial and ethnic differences in the association of body mass index and survival in maintenance hemodialysis patients. *American Journal of Kidney Diseases*, 58(4), 574–582. <https://doi.org/10.1053/j.ajkd.2011.03.023>
- Ritchie, R. F., Palomaki, G. E., Neveux, L. M., Navolotskaia, O., Ledue, T. B., & Craig, W. Y. (2002). Reference distributions for serum iron and transferrin saturation: A practical, simple, and clinically relevant approach in a large cohort. *Journal of Clinical Laboratory Analysis*, 16(5), 237–245. <https://doi.org/10.1002/jcla.10048>
- Ritter-Gooder, P. K., Lewis, N. M., Barber-Heidal, K., & Waltz-Hill, M. (2007). Development and pilot testing of an omega-3 fatty acid food frequency questionnaire. *Journal of Food Composition and Analysis*, 21(1), S43–S49. <https://doi.org/10.1016/j.jfca.2007.05.003>
- Robinson, B. M., Tong, L., Zhang, J., Wolfe, R. A., Goodkin, D. A., Greenwood, R. N., Kerr, P. G., Morgenstern, H., Li, Y., Pisoni, R. L., Saran, R., Tentori, F., Akizawa, T., Fukuhara, S., & Port, F. K. (2012). Blood pressure levels and mortality risk among hemodialysis patients in the Dialysis Outcomes and Practice Patterns Study. *Kidney International*, 82(5), 570–580. <https://doi.org/10.1038/ki.2012.136>
- Rodrigo, C. P., Aranceta, J., Salvador, G., & Varela-Moreiras, G. (2015). Food frequency questionnaires. *Nutricion Hospitalaria*, 31(3), 49–56. <https://doi.org/10.3305/nh.2015.31.sup3.8751>
- Roswall, N., Olsen, A., Christensen, J., Dragsted, L. O., Overvad, K., & Tjønneland, A. (2010). Source-specific effects of micronutrients in lung cancer prevention. *Lung Cancer (Amsterdam, Netherlands)*, 67(3), 275–281. <https://doi.org/10.1016/j.lungcan.2009.11.010>
- Ryu, D. R., Kim, J. H., Kim, H. J., Kyung, M. S., & Park, J. T. (2017). Comparison Between Semi-Quantitative Frequency Methods and 7-day Dietary Records Methods in Food and Nutrition Intake Status For Hemodialysis Patients. *Korean J Community Nutr*, 22(5), 426.
- Sabanayagam, C., Lim, S. C., Wong, T. Y., Lee, J., Shankar, A., & Tai, E. S. (2010). Ethnic disparities in prevalence and impact of risk factors of chronic kidney disease. *Nephrology, Dialysis, Transplantation*, 25(8), 2564–2570. <https://doi.org/10.1093/ndt/gfq084>
- Sabatino, A., Regolisti, G., Karupaiah, T., Sahathevan, S., Sadu Singh, B. K., Khor, B. H., Salhab, N., Karavetian, M., Cupisti, A., & Fiaccadori, E. (2017). Protein-energy wasting and nutritional supplementation in patients with end-stage renal disease on hemodialysis. *Clinical Nutrition*, 36(3), 663–671. <https://doi.org/10.1016/j.clnu.2016.06.007>
- Sadeghi, S. M., Sadeghi, F., & Akhlaghi, M. (2019). Effect of Zinc Supplementation on Weight and Food Intake in Patients under Hemodialysis. *International Journal of Nutrition Sciences*, 4(2), 71–77.
- Saglimbene, V. M., Wong, G., Teixeira-Pinto, A., Ruospo, M., Garcia-Larsen, V., Palmer, S. C., Natale, P., Campbell, K., Carrero, J.-J., Stenvinkel, P., Gargano, L., Murgo, A. M., Johnson, D. W., Tonelli, M., Gelfman, R., Celia, E., Ecker, T., Bernat, A. G., Del Castillo, D., ... Yilmaz, Z. (2020). Dietary Patterns and Mortality in a Multinational Cohort of Adults Receiving Hemodialysis.

- American Journal of Kidney Diseases*, 75(3), 361–372. <https://doi.org/10.1053/j.ajkd.2019.05.028>
- Sahathevan, S., Se, C. H., Ng, S. H., Chinna, K., Harvinder, G. S., Chee, W. S. S., Goh, B. L., Gafor, H. A., Bavanandan, S., Ahmad, G., & Karupaiah, T. (2015). Assessing protein energy wasting in a Malaysian haemodialysis population using self-reported appetite rating: A cross-sectional study. *BMC Nephrology*, 16, 99. <https://doi.org/10.1186/s12882-015-0073-x>
- Sakao, Y., Ojima, T., Yasuda, H., Hashimoto, S., Hasegawa, T., Iseki, K., Tsubakihara, Y., & Kato, A. (2016). Serum Creatinine Modifies Associations between Body Mass Index and Mortality and Morbidity in Prevalent Hemodialysis Patients. *PLOS ONE*, 11(3), e0150003. <https://doi.org/10.1371/journal.pone.0150003>
- Salem, C. B., Badreddine, A., Fathallah, N., Slim, R., & Hmouda, H. (2014). Drug-Induced Hyperkalemia. *Drug Safety*, 37(9), 677–692. <https://doi.org/10.1007/s40264-014-0196-1>
- Saltissi, D., Morgan, C., Knight, B., Chang, W., Rigby, R., & Westhuyzen, J. (2001). Effect of lipid-lowering dietary recommendations on the nutritional intake and lipid profiles of chronic peritoneal dialysis and hemodialysis patients. *American Journal of Kidney Diseases*, 37(6), 1209–1215. <https://doi.org/10.1053/ajkd.2001.24524>
- Sánchez, A., Rojas, P., Basfi-Fer, K., Carrasco, F., Inostroza, J., Codoceo, J., Valencia, A., Papapietro, K., Csendes, A., & Ruz, M. (2016). Micronutrient Deficiencies in Morbidly Obese Women Prior to Bariatric Surgery. *Obesity Surgery*, 26(2), 361–368. <https://doi.org/10.1007/s11695-015-1773-9>
- Sanghavi, S., Whiting, S., & Uribarri, J. (2013). Potassium Balance in Dialysis Patients. *Seminars in Dialysis*, 26(5), 597–603. <https://doi.org/10.1111/sdi.12123>
- Sangoseni, O., Hellman, M., & Hill, C. (2013). Development and Validation of a Questionnaire to Assess the Effect of Online Learning on Behaviors, Attitudes, and Clinical Practices of Physical Therapists in the United States Regarding Evidenced-based Clinical Practice. *Internet Journal of Allied Health Sciences and Practice*, 11(2), 12.
- Sarwar, S., & Sherman, R. A. (2017). How Well Does Serum Albumin Correlate With Dietary Protein Intake in Dialysis Patients? *Kidney International Reports*, 2(1), 90–93. <https://doi.org/10.1016/j.ekir.2016.09.004>
- Saunders, A. V., Craig, W. J., Baines, S. K., & Posen, J. S. (2013). Iron and vegetarian diets. *The Medical Journal of Australia*, 199(4), S11–S16. <https://doi.org/10.5694/mja11.11494>
- Sauvageot, N., Alkerwi, A., Albert, A., & Guillaume, M. (2013). Use of food frequency questionnaire to assess relationships between dietary habits and cardiovascular risk factors in NESCAV study: Validation with biomarkers. *Nutrition Journal*, 12(1), 143. <https://doi.org/10.1186/1475-2891-12-143>
- Schlüssel, M. M., Anjos, L. A. dos, Vasconcellos, M. T. L. de, & Kac, G. (2008). Reference values of handgrip dynamometry of healthy adults: A population-based study. *Clinical Nutrition*, 27(4), 601–607. <https://doi.org/10.1016/j.clnu.2008.04.004>
- Schumacher, T. L., Burrows, T. L., Rollo, M. E., Wood, L. G., Callister, R., & Collins, C. E. (2016). Comparison of fatty acid intakes assessed by a cardiovascular-specific food frequency questionnaire with red blood cell membrane fatty acids in hyperlipidaemic Australian adults: A validation study. *European Journal of Clinical Nutrition*, 70(12), 1433–1438. <https://doi.org/10.1038/ejcn.2016.144>
- Schüpbach, R., Wegmüller, R., Berguerand, C., Bui, M., & Herter-Aeberli, I. (2017). Micronutrient status and intake in omnivores, vegetarians and vegans in

- Switzerland. *European Journal of Nutrition*, 56(1), 283–293. <https://doi.org/10.1007/s00394-015-1079-7>
- Sechi, L. A., Catena, C., Zingaro, L., Melis, A., & Marchi, S. D. (2002). Abnormalities of Glucose Metabolism in Patients With Early Renal Failure. *Diabetes*, 51(4), 1226–1232. <https://doi.org/10.2337/diabetes.51.4.1226>
- Semba, R. D. (2012). The historical evolution of thought regarding multiple micronutrient nutrition. *The Journal of Nutrition*, 142(1), 143S–56S. <https://doi.org/10.3945/jn.110.137745>
- Serra-Majem, Lluís, Andersen, L. F., Henríque-Sánchez, P., Doreste-Alonso, J., Sánchez-Villegas, A., Ortiz-Andrelluchi, A., Negri, E., & Vecchia, C. L. (2009). Evaluating the quality of dietary intake validation studies. *British Journal of Nutrition*, 102(S1), S3–S9. <https://doi.org/10.1017/S0007114509993114>
- Serra-Majem, Lluís, Bes-Rastrollo, M., Román-Viñas, B., Pfrimer, K., Sánchez-Villegas, A., & Martínez-González, M. A. (2009). Dietary patterns and nutritional adequacy in a Mediterranean country. *British Journal of Nutrition*, 101(S2), S21–S28. <https://doi.org/10.1017/S0007114509990559>
- Shah, A., Bross, R., Shapiro, B. B., Morrison, G., & Kopple, J. D. (2016). Dietary energy requirements in relatively healthy maintenance hemodialysis patients estimated from long-term metabolic studies. *The American Journal of Clinical Nutrition*, 103(3), 757–765. <https://doi.org/10.3945/ajcn.115.112995>
- Shahar, S., Lin, C. H., & Haron, H. (2014). Development and Validation of Food Frequency Questionnaire (FFQ) for Estimation of the Dietary Polyphenol Intake Among Elderly Individuals in Klang Valley. *Jurnal Sains Kesihatan Malaysia (Malaysian Journal of Health Sciences)*, 12(2). <http://ejournal.ukm.my/jskm/article/view/8116>
- Shaman, A. M., & Kowalski, S. R. (2016). Hyperphosphatemia Management in Patients with Chronic Kidney Disease. *Saudi Pharmaceutical Journal*, 24(4), 494–505. <https://doi.org/10.1016/j.jsps.2015.01.009>
- Shanita, N. S., Norimah, A. K., & Abu Hanifah, S. (2012). Development and validation of a Food Frequency Questionnaire (FFQ) for assessing sugar consumption among adults in Klang Valley, Malaysia. *Malaysian Journal of Nutrition*, 18(3), 283–293.
- Shapiro, B. B., Bross, R., Morrison, G., Zadeh, K., & Kopple, J. D. (2015). Self-reported, interview-assisted diet records underreport energy intake in maintenance hemodialysis patients. *Journal of Renal Nutrition : The Official Journal of the Council on Renal Nutrition of the National Kidney Foundation*, 25(4), 357–363. <https://doi.org/10.1053/j.jrn.2014.12.004>
- Sharma, M, Rao, M., Jacob, S., & Jacob, C. K. (1998). Validation of 24-hour dietary recall: A study in hemodialysis patients. *Journal of Renal Nutrition*, 8(4), 199–202. [https://doi.org/10.1016/S1051-2276\(98\)90018-8](https://doi.org/10.1016/S1051-2276(98)90018-8)
- Sharma, Manju, Rao, M., Jacob, S., & Jacob, C. K. (1999). A dietary survey in Indian hemodialysis patients. *Journal of Renal Nutrition*, 9(1), 21–25. [https://doi.org/10.1016/S1051-2276\(99\)90018-3](https://doi.org/10.1016/S1051-2276(99)90018-3)
- Sharma, Manju, Rao, M., Jacob, S., & Jacob, C. K. (2002). A controlled trial of intermittent enteral nutrient supplementation in maintenance hemodialysis patients. *Journal of Renal Nutrition*, 12(4), 229–237. <https://doi.org/10.1053/jren.2002.35300>
- Shatenstein, B., Nadon, S., Godin, C., & Ferland, G. (2005). Development and validation of a food frequency questionnaire. *Canadian Journal of Dietetic Practice and Research*, 66(2), 67–75. <https://doi.org/10.3148/66.2.2005.67>

- Sherman, R. A. (2016). Hyperphosphatemia in Dialysis Patients: Beyond Nonadherence to Diet and Binders. *American Journal of Kidney Diseases*, 67(2), 182–186. <https://doi.org/10.1053/j.ajkd.2015.07.035>
- Shim, J. S., Oh, K., & Kim, H. C. (2014). Dietary assessment methods in epidemiologic studies. *Epidemiology and Health*, 36, e2014009. <https://doi.org/10.4178/epih/e2014009>
- Shinaberger, C. S., Greenland, S., Kopple, J. D., Van Wyck, D., Mehrotra, R., Kovesdy, C. P., & Kalantar-Zadeh, K. (2008). Is controlling phosphorus by decreasing dietary protein intake beneficial or harmful in persons with chronic kidney disease? *The American Journal of Clinical Nutrition*, 88(6), 1511–1518. <https://doi.org/10.3945/ajcn.2008.26665>
- Shinaberger, C. S., Kilpatrick, R. D., Regidor, D. L., McAllister, C. J., Greenland, S., Kopple, J. D., & Kalantar-Zadeh, K. (2006). Longitudinal Associations Between Dietary Protein Intake and Survival in Hemodialysis Patients. *American Journal of Kidney Diseases*, 48(1), 37–49. <https://doi.org/10.1053/j.ajkd.2006.03.049>
- Singapore Health Promotion Board. (2003). Food Composition Guide Singapore. Health Promotion Board. <https://focos.hpb.gov.sg/eservices/ENCF/>
- Sinha, A. D., & Agarwal, R. (2009). Can chronic volume overload be recognized and prevented in hemodialysis patients? The pitfalls of the clinical examination in assessing volume status. *Seminars in Dialysis*, 22(5), 480–482. <https://doi.org/10.1111/j.1525-139X.2009.00641.x>
- Siyam, F. F., & Klachko, D. M. (2013). What Is Hypercalcemia? The Importance of Fasting Samples. *Cardiovascular Medicine*, 3(4), 232–238. <https://doi.org/10.1159/000355526>
- Slater, B., Enes, C. C., López, R. V. M., Damasceno, N. R. T., & Voci, S. M. (2010). Validation of a food frequency questionnaire to assess the consumption of carotenoids, fruits and vegetables among adolescents: The method of triads. *Cadernos de Saúde Pública*, 26(11), 2090–2100. <https://doi.org/10.1590/S0102-311X2010001100010>
- Stallone, D. D., Brunner, E. J., Bingham, S. A., & Marmot, M. G. (1997). Dietary assessment in Whitehall II: The influence of reporting bias on apparent socioeconomic variation in nutrient intakes. *European Journal of Clinical Nutrition*, 51(12), 815–825.
- Steiber, A., Leon, J. B., Secker, D., McCarthy, M., McCann, L., Serra, M., Sehgal, A. R., & Kalantar-Zadeh, K. (2007). Multicenter Study of the Validity and Reliability of Subjective Global Assessment in the Hemodialysis Population. *Journal of Renal Nutrition*, 17(5), 336–342. <https://doi.org/10.1053/j.jrn.2007.05.004>
- Stiegler, P., Sausenthaler, S., Buyken, A. E., Rzehak, P., Czech, D., Linseisen, J., Kroke, A., Gedrich, K., Robertson, C., & Heinrich, J. (2010). A new FFQ designed to measure the intake of fatty acids and antioxidants in children. *Public Health Nutrition*, 13(1), 38–46. <https://doi.org/10.1017/S13689800090005813>
- St-Jules, D. E., Goldfarb, D. S., & Sevcik, M. A. (2016). Nutrient Non-equivalence: Does Restricting High-Potassium Plant Foods Help to Prevent Hyperkalemia in Hemodialysis Patients? *Journal of Renal Nutrition*, 26(5), 282–287. <https://doi.org/10.1053/j.jrn.2016.02.005>
- St-Jules, D. E., Woolf, K., Pompeii, M. L., & Sevcik, M. A. (2016). Exploring Problems in Following the Hemodialysis Diet and Their Relation to Energy and Nutrient Intakes: The BalanceWise Study. *Journal of Renal Nutrition*, 26(2), 118–124. <https://doi.org/10.1053/j.jrn.2015.10.002>

- Straßburg, A., Eisinger-Watzl, M., Krems, C., Roth, A., & Hoffmann, I. (2019). Comparison of food consumption and nutrient intake assessed with three dietary assessment methods: Results of the German National Nutrition Survey II. *European Journal of Nutrition*, 58(1), 193–210. <https://doi.org/10.1007/s00394-017-1583-z>
- Streja, E., Lau, W. L., Goldstein, L., Sim, J. J., Molnar, M. Z., Nissenson, A. R., Kovesdy, C. P., & Kalantar-Zadeh, K. (2013). Hyperphosphatemia is a combined function of high serum PTH and high dietary protein intake in dialysis patients. *Kidney International Supplements*, 3(5), 462–468. <https://doi.org/10.1038/kisup.2013.96>
- Streja, E., Wang, H.-Y., Lau, W. L., Molnar, M. Z., Kovesdy, C. P., Kalantar-Zadeh, K., & Park, J. (2014). Mortality of combined serum phosphorus and parathyroid hormone concentrations and their changes over time in hemodialysis patients. *Bone*, 61, 201–207. <https://doi.org/10.1016/j.bone.2014.01.016>
- Su, C.-T., Yabes, J., Pike, F., Weiner, D. E., Beddhu, S., Burrowes, J. D., Rocco, M. V., & Unruh, M. L. (2013). Changes in anthropometry and mortality in maintenance hemodialysis patients in the HEMO Study. *American Journal of Kidney Diseases*, 62(6), 1141–1150. <https://doi.org/10.1053/j.ajkd.2013.05.015>
- Subar, A. F. (2004). Developing dietary assessment tools. *Journal of the American Dietetic Association*, 104(5), 769–770. <https://doi.org/10.1016/j.jada.2004.02.007>
- Subar, A. F., Crafts, J., Zimmerman, T. P., Wilson, M., Mittl, B., Islam, N. G., McNutt, S., Potischman, N., Buday, R., Hull, S. G., Baranowski, T., Guenther, P. M., Willis, G., Tapia, R., & Thompson, F. E. (2010). Assessment of the accuracy of portion size reports using computer-based food photographs aids in the development of an automated self-administered 24-hour recall. *Journal of the American Dietetic Association*, 110(1), 55–64. <https://doi.org/10.1016/j.jada.2009.10.007>
- Subar, A. F., Thompson, F. E., Kipnis, V., Midthune, D., Hurwitz, P., McNutt, S., McIntosh, A., & Rosenfeld, S. (2001). Comparative Validation of the Block, Willett, and National Cancer Institute Food Frequency Questionnaires The Eating at America's Table Study. *American Journal of Epidemiology*, 154(12), 1089–1099. <https://doi.org/10.1093/aje/154.12.1089>
- Subar, A. F., Ziegler, R. G., Thompson, F. E., Johnson, C. C., Weissfeld, J. L., Reding, D., Kavounis, K. H., & Hayes, R. B. (2001). Is Shorter Always Better? Relative Importance of Questionnaire Length and Cognitive Ease on Response Rates and Data Quality for Two Dietary Questionnaires. *American Journal of Epidemiology*, 153(4), 404–409. <https://doi.org/10.1093/aje/153.4.404>
- Sulaiman, S., Shahril, M. R., Shahrudin, S. H., Isa, N. M., & Hussain, S. N. A. S. (2008). Semi-Quantitative Food Frequency Questionnaire for Assessment of Energy, Total Fat, Fatty Acids, and Vitamin A, C and E Intake among Malaysian Women: Comparison with Three Days 24-Hour Diet Recalls. *Jurnal Sains Kesihatan Malaysia (Malaysian Journal of Health Sciences)*, 6(2). <http://ejournals.ukm.my/jskm/article/view/2318>
- Sullivan, B. L., Brown, J., Williams, P. G., & Meyer, B. J. (2008). Dietary validation of a new Australian food-frequency questionnaire that estimates long-chain n-3 polyunsaturated fatty acids. *British Journal of Nutrition*, 99(03). <https://doi.org/10.1017/S0007114507837408>
- Surendra, N. K., Manaf, M. R. A., Seong, H. L., Bavanandan, S., Safhan, F., Nor, M., Khan, S. S. F., Meng, O. L., & Gafar, A. H. A. (2018). The Cost Of Dialysis In

- Malaysia: Haemodialysis And Continuous Ambulatory Peritoneal Dialysis. *Malaysian Journal of Public Health Medicine*, 18(2), 12.
- Swierk, M., Williams, P. G., Wilcox, J., Russell, K. G., & Meyer, B. J. (2011). Validation of an Australian electronic food frequency questionnaire to measure polyunsaturated fatty acid intake. *Nutrition*, 27(6), 641–646. <https://doi.org/10.1016/j.nut.2010.06.011>
- Swinburn, B. A., Caterson, I., Seidell, J. C., & James, W. P. T. (2004). Diet, nutrition and the prevention of excess weight gain and obesity. *Public Health Nutrition*, 7(1A), 123–146.
- Taib, S. M., & Isa, Z. M. (2013). Dietary Iodine from Interview-Based Semi-Quantitative Food Frequency Questionnaire: Correlation with 24h Dietary Recall. *Pakistan Journal of Nutrition*, 12(7), 688–691. <https://doi.org/DOI:10.3923/pjn.2013.688.691>
- Talemaitoga, A. S., Sanders, B. A., Hinton, D., & Lynn, K. L. (1989). Nutritional Status of Home Hemodialysis Patients. *Australian and New Zealand Journal of Medicine*, 19(4), 303–309. <https://doi.org/10.1111/j.1445-5994.1989.tb00267.x>
- Tallman, D. A., Latifi, E., Kaur, D., Sulaheen, A., Ikizler, T. A., Chinna, K., Mat Daud, Z. A., Karupaiah, T., & Khosla, P. (2020). Dietary Patterns and Health Outcomes among African American Maintenance Hemodialysis Patients. *Nutrients*, 12(3), 797. <https://doi.org/10.3390/nu12030797>
- Tanaka, S., Ninomiya, T., Taniguchi, M., Tokumoto, M., Masutani, K., Ooboshi, H., Kitazono, T., & Tsuruya, K. (2017). Impact of blood urea nitrogen to creatinine ratio on mortality and morbidity in hemodialysis patients: The Q-Cohort Study. *Scientific Reports*, 7. <https://doi.org/10.1038/s41598-017-14205-2>
- Tasevska, N., Midthune, D., Potischman, N., Subar, A. F., Cross, A. J., Bingham, S. A., Schatzkin, A., & Kipnis, V. (2011). Use of the predictive sugars biomarker to evaluate self-reported total sugars intake in the Observing Protein and Energy Nutrition (OPEN) study. *Cancer Epidemiology, Biomarkers & Prevention*, 20(3), 490–500. <https://doi.org/10.1158/1055-9965.EPI-10-0820>
- Tasevska, N., Runswick, S. A., & Bingham, S. A. (2006). Urinary Potassium Is as Reliable as Urinary Nitrogen for Use as a Recovery Biomarker in Dietary Studies of Free Living Individuals. *The Journal of Nutrition*, 136(5), 1334–1340. <https://doi.org/10.1093/jn/136.5.1334>
- Tee, E. S., Mohd Ismail, N., Mohd Nasir, A., & Khatijah, I. (1997). *Nutrient composition of Malaysian foods* (4th ed). Institute for Medical Research Malaysia.
- The International Society for the Advancement of Kinanthropometry. (2001). *International Standards for Anthropometric Assessment*. The International Society For The Advancement of Kinanthropometry.
- Thompson, F. E., & Subar, A. F. (2013). *Dietary Assessment Methodology. Nutrition in the Prevention and Treatment of Disease*. (2nd Edition). Academic Press.
- Thompson, Frances E., Kirkpatrick, S. I., Subar, A. F., Reedy, J., Schap, T. E., Wilson, M. M., & Krebs-Smith, S. M. (2015). The National Cancer Institute's Dietary Assessment Primer: A Resource for Diet Research. *Journal of the Academy of Nutrition and Dietetics*, 115(12), 1986–1995. <https://doi.org/10.1016/j.jand.2015.08.016>
- Thompson, Frances E., Midthune, D., Subar, A. F., Kipnis, V., Kahle, L. L., & Schatzkin, A. (2007). Development and evaluation of a short instrument to estimate usual dietary intake of percentage energy from fat. *Journal of the American Dietetic Association*, 107(5), 760–767. <https://doi.org/10.1016/j.jada.2007.02.006>

- Thompson, Frances E., & Subar, A. F. (2008a). Dietary Assessment Methodology. In *Nutrition in the Prevention and Treatment of Disease* (Second Edition, pp. 5–48). Academic Press.
- Thompson, Frances E., & Subar, A. F. (2008b). Dietary Assessment Methodology. In *Nutrition in the Prevention and Treatment of Disease* (Second Edition, pp. 5–48). Academic Press.
- Thompson, Frances E., & Subar, A. F. (2017a). Dietary Assessment Methodology. In *Nutrition in the Prevention and Treatment of Disease* (pp. 5–48). Elsevier. <https://doi.org/10.1016/B978-0-12-802928-2.00001-1>
- Thompson, Frances E., & Subar, A. F. (2017b). *Dietary Assessment Methodology* (2nd Edition). Elsevier. <https://doi.org/10.1016/B978-0-12-802928-2.00001-1>
- Thunberg, B. J., Swamy, A. P., & Cestero, R. V. M. (1981). Cross-sectional and longitudinal nutritional measurements in maintenance hemodialysis patients. *The American Journal of Clinical Nutrition*, *34*(10), 2005–2012. <https://doi.org/10.1093/ajcn/34.10.2005>
- Ting, I. P. L., Adnan, A., Imran, K., & Alfatah, A. W. (2018). Predictive Factors of First-Year Mortality in Newly Diagnosed End-Stage Renal Disease Patients Commencing on Hemodialysis in Kelantan, Malaysia. *Journal of Nephrology Forecast*, *1*(1), 1–9.
- Tomson, C. R. V. (2001). Advising dialysis patients to restrict fluid intake without restricting sodium intake is not based on evidence and is a waste of time. *Nephrology Dialysis Transplantation*, *16*(8), 1538–1542. <https://doi.org/10.1093/ndt/16.8.1538>
- Toussaint, N., Cooney, P., & Kerr, P. G. (2006). Review of dialysate calcium concentration in hemodialysis. *Hemodialysis International*, *10*(4), 326–337. <https://doi.org/10.1111/j.1542-4758.2006.00125.x>
- Touvier, M., Kesse-Guyot, E., Méjean, C., Pollet, C., Malon, A., Castetbon, K., & Hercberg, S. (2011). Comparison between an interactive web-based self-administered 24 h dietary record and an interview by a dietitian for large-scale epidemiological studies. *British Journal of Nutrition*, *105*(07), 1055–1064. <https://doi.org/10.1017/S0007114510004617>
- Tsuruya, K., Fukuma, S., Wakita, T., Ninomiya, T., Nagata, M., Yoshida, H., Fujimi, S., Kiyohara, Y., Kitazono, T., Uchida, K., Shirota, T., Akizawa, T., Akiba, T., Saito, A., & Fukuhara, S. (2015). Dietary Patterns and Clinical Outcomes in Hemodialysis Patients in Japan: A Cohort Study. *PLOS ONE*, *10*(1), e0116677. <https://doi.org/10.1371/journal.pone.0116677>
- Tucker, K. L. (2007). Assessment of usual dietary intake in population studies of gene–diet interaction. *Nutrition, Metabolism and Cardiovascular Diseases*, *17*(2), 74–81. <https://doi.org/10.1016/j.numecd.2006.07.010>
- Tucker, K. L., Maras, J., Champagne, C., Connell, C., Goolsby, S., Weber, J., Zaghoul, S., Carithers, T., & Bogle, M. L. (2005). A regional food-frequency questionnaire for the US Mississippi Delta. *Public Health Nutrition*, *8*(01). <https://doi.org/10.1079/PHN2004663>
- United States Renal Data System. (2018). *USRDS annual data report: Epidemiology of kidney disease in the United States*. National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases. <https://www.usrds.org/2018/view/Default.aspx>
- USDA. (2011). USDA Nutrient Database for Standard Reference. <http://ndb.nal.usda.gov/>
- van Vliet, S., Skinner, S. K., Beals, J. W., Pagni, B. A., Fang, H.-Y., Ulanov, A. V., Li, Z., Paluska, S. A., Mazzulla, M., West, D. W. D., Moore, D. R., Wilund, K. R.,

- & Burd, N. A. (2018). Dysregulated Handling of Dietary Protein and Muscle Protein Synthesis After Mixed-Meal Ingestion in Maintenance Hemodialysis Patients. *Kidney International Reports*, 3(6), 1403–1415. <https://doi.org/10.1016/j.ekir.2018.08.001>
- Vaz, I. M. F., Freitas, A. T. V. de S., Peixoto, M. do R. G., Ferraz, S. F., & Campos, M. I. V. A. M. (2015). Is energy intake underreported in hemodialysis patients? *Jornal Brasileiro De Nefrologia: 'Orgao Oficial De Sociedades Brasileira E Latino-Americana De Nefrologia*, 37(3), 359–366. <https://doi.org/10.5935/0101-2800.20150056>
- Vendrey, B., Chauveau, P., Barthe, N., El Haggan, W., Castaing, F., De Précigout, V., Combe, C., & Aparicio, M. (2003). Nutrition in hemodialysis patients previously on a supplemented very low protein diet. *Kidney International*, 63(4), 1491–1498. <https://doi.org/10.1046/j.1523-1755.2003.00884.x>
- Vernaglion, L., Marangi, A. L., Cristofano, C., Giordano, R., Chimienti, S., & Basile, C. (2003). Predictors of serum creatinine in haemodialysis patients: A cross-sectional analysis. *Nephrology Dialysis Transplantation*, 18(6), 1209–1213. <https://doi.org/10.1093/ndt/gfg269>
- Vervloet, M. G., Ittersum, F. J. van, Büttler, R. M., Heijboer, A. C., Blankenstein, M. A., & Wee, P. M. ter. (2011). Effects of Dietary Phosphate and Calcium Intake on Fibroblast Growth Factor-23. *Clinical Journal of the American Society of Nephrology*, 6(2), 383–389. <https://doi.org/10.2215/CJN.04730510>
- Viera, A. J., & Wouk, N. (2015). Potassium Disorders: Hypokalemia and Hyperkalemia. *American Family Physician*, 92(6), 487–495.
- Vioque, J., Navarrete-Muñoz, E.-M., Gimenez-Monzó, D., García-de-la-Hera, M., Granado, F., Young, I. S., Ramón, R., Ballester, F., Murcia, M., Rebagliato, M., Iñiguez, C., & INMA-Valencia Cohort Study. (2013). Reproducibility and validity of a food frequency questionnaire among pregnant women in a Mediterranean area. *Nutrition Journal*, 12(1), 26. <https://doi.org/10.1186/1475-2891-12-26>
- Vodičar, J., Pajek, J., Hadžić, V., & Bučar Pajek, M. (2018). Relation of Lean Body Mass and Muscle Performance to Serum Creatinine Concentration in Hemodialysis Patients. *BioMed Research International*, 2018, 1–7. <https://doi.org/10.1155/2018/4816536>
- Vogt, B. P., Borges, M. C. C., Goés, C. R. de, & Caramori, J. C. T. (2016). Handgrip strength is an independent predictor of all-cause mortality in maintenance dialysis patients. *Clinical Nutrition*, 35(6), 1429–1433. <https://doi.org/10.1016/j.clnu.2016.03.020>
- Wakai, K. (2009). A Review of Food Frequency Questionnaires Developed and Validated in Japan. *Journal of Epidemiology*, 19(1), 1–11. <https://doi.org/10.2188/jea.JE20081007>
- Wang, H., Wang, D., Ouyang, Y., Huang, F., Ding, G., & Zhang, B. (2017). Do Chinese Children Get Enough Micronutrients? *Nutrients*, 9(4). <https://doi.org/10.3390/nu9040397>
- Welch, R. M., & Graham, R. D. (2005). Agriculture: The real nexus for enhancing bioavailable micronutrients in food crops. *Journal of Trace Elements in Medicine and Biology: Organ of the Society for Minerals and Trace Elements (GMS)*, 18(4), 299–307. <https://doi.org/10.1016/j.jtemb.2005.03.001>
- West, K. P., & Mehra, S. (2010). Vitamin A Intake and Status in Populations Facing Economic Stress. *The Journal of Nutrition*, 140(1), 201S–207S. <https://doi.org/10.3945/jn.109.112730>

- White, S. L., Cass, A., Atkins, R. C., & Chadban, S. J. (2005). Chronic kidney disease in the general population. *Advances in Chronic Kidney Disease*, 12(1), 5–13. <https://doi.org/10.1053/j.ackd.2004.10.009>
- Whitton, C., Ho, J. C. Y., Tay, Z., Rebello, S. A., Lu, Y., Ong, C. N., & Van Dam, R. M. (2017). Relative Validity and Reproducibility of a Food Frequency Questionnaire for Assessing Dietary Intakes in a Multi-Ethnic Asian Population Using 24-h Dietary Recalls and Biomarkers. *Nutrients*, 9(10), 1059. <https://doi.org/10.3390/nu9101059>
- WHO Expert Consultation. (2004). Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. *The Lancet*, 363(9403), 157–163. [https://doi.org/10.1016/S0140-6736\(03\)15268-3](https://doi.org/10.1016/S0140-6736(03)15268-3)
- Willett, W. (1998). *Food-Frequency Methods* (Second Edition). Oxford University Press.
- Willett, W. (2013). *Nutritional epidemiology* (3rd Edition). Oxford University Press.
- Willett, W. C. (1998). *Nutritional Epidemiology* (Second Edition). Oxford University Press, USA.
- Wong, A. H., Chin, L. E., Ping, T. L., Peng, N. K., & Kun, L. S. (2016). Clinical impact of education provision on determining advance care planning decisions among end stage renal disease patients receiving regular hemodialysis in university malaya medical centre. *Indian Journal of Palliative Care*, 22(4), 437. <https://doi.org/10.4103/0973-1075.191788>
- Wong, H., & Goh, B. (2015). *Twenty Third Report of the Malaysian Dialysis and Transplant Registry* (p. 25). National Renal Registry.
- Wong, J. E., Parnell, W. R., Black, K. E., & Skidmore, P. M. (2012). Reliability and relative validity of a food frequency questionnaire to assess food group intakes in New Zealand adolescents. *Nutrition Journal*, 11(1). <https://doi.org/10.1186/1475-2891-11-65>
- Wong, S. W., Chan, Y. M., & Lim, T. S. (2011). Correlates of Physical Activity Level among Hemodialysis Patients in Selangor, Malaysia. *Malaysian Journal of Nutrition*, 17(3), 277–286.
- Wulandari, H., Susetyowati, & Prasanto, H. (2018). Comparison between brief food frequency questionnaire and food record to assess the energy and protein intake of hemodialysis patients at Dr. Sardjito Hospital in Indonesia. *Saudi Journal of Kidney Diseases and Transplantation*, 29(1), 145. <https://doi.org/10.4103/1319-2442.225196>
- Wyskida, K., Żak-Gołąb, A., Wajda, J., Klein, D., Witkiewicz, J., Ficek, R., Rotkegel, S., Spiechowicz, U., Kocemba Dyczek, J., Ciepał, J., Olszanecka-Glinianowicz, M., Więcek, A., & Chudek, J. (2016). Functional deficiency of vitamin K in hemodialysis patients in Upper Silesia in Poland. *International Urology and Nephrology*, 48, 765–771. <https://doi.org/10.1007/s11255-016-1255-6>
- Xia, W., Sun, C., Zhang, L., Zhang, X., Wang, J., Wang, H., & Wu, L. (2011). Reproducibility and Relative Validity of a Food Frequency Questionnaire Developed for Female Adolescents in Suihua, North China. *PLoS ONE*, 6(5), e19656. <https://doi.org/10.1371/journal.pone.0019656>
- Xie, L.-M., Ge, Y.-Y., Huang, X., Zhang, Y.-Q., & Li, J.-X. (2015). Effects of fermentable dietary fiber supplementation on oxidative and inflammatory status in hemodialysis patients. *International Journal of Clinical and Experimental Medicine*, 8(1), 1363–1369.
- Yamada, K., Furuya, R., Takita, T., Maruyama, Y., Yamaguchi, Y., Ohkawa, S., & Kumagai, H. (2008). Simplified nutritional screening tools for patients on

- maintenance hemodialysis. *The American Journal of Clinical Nutrition*, 87(1), 106–113. <https://doi.org/10.1093/ajcn/87.1.106>
- Yang, Y., Qin, X., Li, Y., Lei, Z., Li, Y., Yang, S., Li, Y., Kong, Y., Lu, Y., Zhao, Y., Wan, Q., Wang, Q., Huang, S., Liu, Y., Liu, A., Liu, F., Hou, F., & Liang, M. (2020). The association between dietary energy intake and the risk of mortality in maintenance haemodialysis patients: A multi-centre prospective cohort study. *British Journal of Nutrition*, 123(4), 437–445. <https://doi.org/10.1017/S0007114519002861>
- Yaroch, A. L., Resnicow, K., Davis, M., Davis, A., Smith, M., & Khan, L. K. (2000). Development of a Modified Picture-Sort Food Frequency Questionnaire Administered to Low-income, Overweight, African-American Adolescent Girls. *Journal of the American Dietetic Association*, 100(9), 1050–1056. [https://doi.org/10.1016/S0002-8223\(00\)00306-0](https://doi.org/10.1016/S0002-8223(00)00306-0)
- Yeak, Z. W. (2016). *Development and Validation of Food Frequency Questionnaire to Characterize Food Intake Related to Cardiovascular Disease* [Unpublished master dissertation]. National University of Malaysia.
- Ying, S. C., & Krishnan, M. (2014). Interpretation Of Quality Of Life Outcomes Amongst End Stage Renal Disease Patients In Selected Hospitals Of Malaysia. *International Journal of Pharmaceutical Sciences and Research*, 5(1), 60–69. [https://doi.org/10.13040/IJPSR.0975-8232.5\(1\).60-69](https://doi.org/10.13040/IJPSR.0975-8232.5(1).60-69)
- Yokoyama, Y., Takachi, R., Ishihara, J., Ishii, Y., Sasazuki, S., Sawada, N., Shinozawa, Y., Tanaka, J., Kato, E., Kitamura, K., Nakamura, K., & Tsugane, S. (2016). Validity of Short and Long Self-Administered Food Frequency Questionnaires in Ranking Dietary Intake in Middle-Aged and Elderly Japanese in the Japan Public Health Center-Based Prospective Study for the Next Generation (JPHC-NEXT) Protocol Area. *Journal of Epidemiology*, 26(8), 420–432. <https://doi.org/10.2188/jea.JE20150064>
- Yun, S. H., Choi, B.-Y., & Kim, M.-K. (2009). The Effect of Seasoning on the Distribution of Nutrient Intakes by a Food-Frequency Questionnaire in a Rural Area. *The Korean Journal of Nutrition*, 42(3), 246. <https://doi.org/10.4163/kjn.2009.42.3.246>
- Yun, S. H., Shim, J.-S., Kweon, S., & Oh, K. (2013). Development of a Food Frequency Questionnaire for the Korea National Health and Nutrition Examination Survey: Data from the Fourth Korea National Health and Nutrition Examination Survey (KNHANES IV). *Korean Journal of Nutrition*, 46(2), 186. <https://doi.org/10.4163/kjn.2013.46.2.186>
- Yusop, N. B. M., Chan, Y. M., Shariff, Z. M., & Huat, C. B. (2013). Factors Associated with Quality of Life among Hemodialysis Patients in Malaysia. *PLOS ONE*, 8(12), e84152. <https://doi.org/10.1371/journal.pone.0084152>
- Yusuf, A. A., Hu, Y., Singh, B., Menoyo, J. A., & Wetmore, J. B. (2016). Serum Potassium Levels and Mortality in Hemodialysis Patients: A Retrospective Cohort Study. *American Journal of Nephrology*, 44(3), 179–186. <https://doi.org/10.1159/000448341>
- Zainuddin, A. A., Md Nor, N., Md Yusof, S., Ibrahim, A. I. N., Aris, T., & Foo, L. H. (2019). Under-reporting of energy and nutrient intake is a persistent issue in the Malaysian Adult Nutrition Surveys. *Malaysian Journal of Nutrition*, 25(2), 261–271.
- Zaki, D. S. D., Mohamed, R. R., Mohammed, N. A. G., & Abdel-Zaher, R. B. (2019). Assessment of Malnutrition Status in Hemodialysis Patients. *Clinical Medicine and Diagnostics*, 9(1), 8–13.

- Zeng, C., Li, H., Wei, J., Yang, T., Deng, Z., Yang, Y., Zhang, Y., Yang, T., & Lei, G. (2015). Association between Dietary Magnesium Intake and Radiographic Knee Osteoarthritis. *PloS One*, *10*(5), e0127666. <https://doi.org/10.1371/journal.pone.0127666>
- Zerwekh, J. E. (2008). Blood biomarkers of vitamin D status. *The American Journal of Clinical Nutrition*, *87*(4), 1087S-91S. <https://doi.org/10.1093/ajcn/87.4.1087S>
- Zhang, B., Wang, P., Chen, C., He, Q., Zhuo, S., Chen, Y., & Su, Y. (2010). Validation of an FFQ to estimate the intake of fatty acids using erythrocyte membrane fatty acids and multiple 3d dietary records. *Public Health Nutrition*, *13*(10), 1546–1552. <https://doi.org/10.1017/S1368980009992849>
- Zhang, H., Qiu, X., Zhong, C., Zhang, K., Xiao, M., Yi, N., Xiong, G., Wang, J., Yao, J., Hao, L., Wei, S., Yang, N., & Yang, X. (2015). Reproducibility and relative validity of a semi-quantitative food frequency questionnaire for Chinese pregnant women. *Nutrition Journal*, *14*(1), 56. <https://doi.org/10.1186/s12937-015-0044-x>
- Zhang, Z.-H., Mao, J.-R., Chen, H., Su, W., Zhang, Y., Zhang, L., Chen, D.-Q., Zhao, Y.-Y., & Vaziri, N. D. (2017). Removal of uremic retention products by hemodialysis is coupled with indiscriminate loss of vital metabolites. *Clinical Biochemistry*, *50*(18), 1078–1086. <https://doi.org/10.1016/j.clinbiochem.2017.09.012>
- Zheng, M., Campbell, K. J., Scanlan, E., & McNaughton, S. A. (2020). Development and evaluation of a food frequency questionnaire for use among young children. *PLOS ONE*, *15*(3), e0230669. <https://doi.org/10.1371/journal.pone.0230669>
- Zoccali, C., Moissl, U., Chazot, C., Mallamaci, F., Tripepi, G., Arkossy, O., Wabel, P., & Stuard, S. (2017). Chronic Fluid Overload and Mortality in ESRD. *Journal of the American Society of Nephrology: JASN*, *28*(8), 2491–2497. <https://doi.org/10.1681/ASN.2016121341>