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Knowledge, Attitudes, and Practices toward Non-Communicable Disease Prevention in Iraqi Communities: A Cross-Sectional Study at Al-Diwaniyah Teaching Hospital

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Abstract: Background: NCDs are an incredible burden on public health in Iraq and the entire MENA region and their growing rates will continue to be a significant concern in the future. The number of NCD cases continues to rise rapidly while the local community level has still not better defined KAPs concerning the prevention of NCDs. This study will assess the KAPs towards the prevention of NCDs among patients and caregivers from Al-Diwaniyah Educational Hospital, examine if certain sociodemographics are contributing to lower KAP scores and to find evidence for creating targeted health promotion programs. Methods: A cross-sectional survey will take place at the Al-Diwaniyah Teaching Hospital, Qadisiyah Governorate, Iraq from January to April of 2024. Participants will be selected from both outpatients and general medical clinics using a systematic random sampling method (420 subjects). Data will be collected via a structured interviewer-administered questionnaire that uses previously validated questions. The questionnaire will consist of 4 sections: socio-demographic characteristics; knowledge of NCDs (15); attitudes towards NCDs (10); and the practices towards NCD (12). NCD-related knowledge, attitudes and practice scores will be dichotomised into adequate and inadequate using established cut-off points for each area. The use of descriptive statistics, chi-square analysis and binary logistic regression analysis will be conducted on the data using SPSS v.26. Results: Overall, of the completed surveys, 52.4% were male and the average participant age was 38.7 (\pm 12.3) years. The average rate of knowledge was calculated to be 54.4% of all participants in the study. The average attitude was calculated to be 61.9% of all participants in the study, while the average rate of adequate practice was 41.7% of all participants in the study. Adequate knowledge was found to significantly correlate with sufficient education (university degree) (AOR = 3.41; 95% CI: 2.10 to 5.54), living in an urban area (AOR = 2.18; 95% CI: 1.44 to 3.31) and being a younger person (ages 18-35) (AOR = 1.87; 95% CI: 1.21 to 2.90). The areas of knowledge and the practices found to have significant deficiencies were in the domains of physical activity and dietary behaviours. There was a significant positive correlation between knowledge and attitude scores ($r = 0.62$, $p < 0.001$). Conclusion: There are major gaps in knowledge and practice related to NCDs in the Iraqi community sample, with identified deficiencies found in lower educational and rural dwellers. There is an urgent need for culturally sensitive and targeted health education programs on diet, physical activity,

and smoking cessation. Al-Diwaniya Educational Hospital can be used as a community-level health promotion resource for NCD prevention.

Keywords: Non-communicable diseases; Knowledge, attitudes, and practices; NCD prevention; Iraq; Al-Diwaniya; Health promotion; Cross-sectional study; Cardiovascular disease; Diabetes mellitus; Community health

Introduction

Noncommunicable diseases (NCDs) are recognized as the primary global causes of death and serious health conditions by the World Health Organization (WHO). Cardiovascular Disease (CVDs), Type 2 Diabetes (T2DM), Chronic Respiratory Disease, and Cancer are the four most frequent non-communicable diseases [1]. Based on information from the World Health Organization (WHO), noncommunicable diseases (NCDs) constitute roughly 74% of worldwide death every year and disproportionately impact low- and middle-income (LMIC) nations; over 85% of these deaths happen in LMICs [2]. Iraq is classified as a lower-middle-income nation; currently, there is an accelerated epidemiological transition underway, with NCDs replacing infectious diseases as the main causes of ill health in Iraq [3]. As many as 68% of annual deaths are attributable to NCDs in Iraq, with approximately 45% of those deaths occurring due solely to cardiovascular disease (CVD). There are estimates of diabetes prevalence rates that range between 8.5% and 13.9% in Iraq, while hypertension affects between 23–30% of adults living in Iraq [4]. There are also many behavioural risk factors such as tobacco use, physical inactivity, poor dietary habits and a significant number of individuals are either obese or overweight [5]. Southern Iraq, including the Qadisiyah Governorate, where Al-Diwaniya is located, has historically faced numerous challenges, including environmental contaminations from war, poverty and healthcare issues, leading to higher risks of developing NCDs [6].

The knowledge, attitudes and practices (KAP) framework has been applied to research aimed at public health to assist with an understanding of cognitive and behavioural factors related to disease prevention within communities [7]. KAP studies reveal essential information about differences between what individuals know about health threats, how they perceive health threats and what preventative behaviours they exhibit [8]. When attempting to prevent NCDs, there are many factors that impede translating knowledge into appropriate preventive behaviours such as cultural practices, financial issues, limited health literacy, and limited access to healthcare [9]. Understanding these dynamics, interventions developed to address NCD Knowledge, Attitudes, and Practices must be based on the local context and also be supported by available literature or evidence [10].

The KAP studies conducted in MENA countries have consistently revealed deficits in KAP related to NCDs. A KAP study in Saudi Arabia reported that only 40% of the community had appropriate knowledge about cardiovascular disease risk factors [11]; a KAP study conducted in Jordan found that 78% of the participants were aware of diabetes as a condition, but only 34% of participants reported knowledge of specific preventive behaviours related to diabetes [12]; a KAP study on hypertension conducted in Iran reported that the positive attitude participants had toward preventing hypertension did not translate into consistent use of appropriate health-promoting behaviours—this is in part due to individual/socioeconomic barriers that exist [13]. These results support the need to disaggregate the three components of the KAP triad to accurately identify points of entry for interventions [14].

As of yet, there is no existing primary research conducted in Iraq that explicitly evaluates the NCD KAP triad. The few existing studies have focused on one specific disease (usually either diabetes [15] or hypertension [16]) instead of taking a broader view of preventing NCDs as a whole. In addition, while there are some KAP studies conducted, most have been supportive studies that focused primarily on clinical care in the hospital setting rather than on community/public health assessment [17]. One notable exception to this is a KAP study conducted in Baghdad in 2021 on self-care among chronic disease patients; only 38% of study participants adhered to recommended self-care and prevention

behaviours related to their chronic conditions [18]. The KAP study performed on diabetic patients in Baghdad did not include participants without a diagnosis and thus cannot conclude anything about the preventive behaviours of the larger community.

Preventive behaviour in an Iraqi context is complicated by culture. A high intake of refined carbohydrates, saturated fats, and red meats along with low participation in physical activity (especially amongst women, who may face socioenvironmental barriers to exercising) creates high-risk behavioural profiles [19]. Tobacco use is still widely socially accepted throughout Iraqi society, especially the smoking of cigarettes and the thermally initiated tobacco in hookah water pipes [20]. These critical cultural factors must inform KAP assessment so that instruments and subsequent interventions are valid in the context [21].

System-level factors in the healthcare system also have a major influence. Chronic underfunding and many years of conflict have resulted in the destruction of Iraq's health care system, the disruption of its health care workforce, and the neglect of the medical and science professions [22]. The Al-Diwaniya Educational Hospital, which is the only tertiary hospital providing care for patients from across the Qadisiyah Governorate (located in Al-Diwaniya, Iraq), serves the diverse range of urban residents located within Al-Diwaniya City and those from rural communities throughout the governorate who use the hospital for health care services. With respect to its physical site at a junction between the delivery of clinical services and teaching or supervising via medical education, it represents a strategically significant venue for KAP research and targeted community health education programmes [23]. The WHO's Global Action Plan for NCDs Prevention and Control 2013-2030 establishes that enhancing health promotion and public education is a key mechanism to reduce the global burden from NCDs [24]. Meanwhile, Iraq's national NCDs strategy has continued to progress while remaining aligned with globally established frameworks; however, resource limitations, as well as inadequate primary healthcare systems, have hindered implementation of this strategy [25]. Therefore, scientific evidence regarding KAP is not simply of academic interest, but an important source for programme planning (i.e., prioritisation of resources) and communication strategies tailored to the setting in Iraq [26].

Sociodemographic disparities associated with KAP are also an important component. In many different settings, education is consistently found to be a positive predictor of preventive behaviours and health knowledge regarding behaviours to prevent NCDs [27]. As education levels between men and women in Iraq are not evenly distributed, the relative significance of the disparities may be greater for public health purposes in Iraq [28]. In addition, women in very conservative cultures are often at a disadvantage in terms of their ability to access health-related information through more formal means, as well as more social barriers preventing them from participating in physical activity [29]. Rural versus urban disparities in acquiring health knowledge and utilisation of preventive medical care have been well reported throughout the world and have specific relevance to Qadisiyah Governorate due to its broad socioeconomic and demographic characteristics [30].

Despite a compelling epidemiological and programmatic rationale for studying KAP relative to NCDs, little research has been done regarding NCD-related KAP in Al-Diwaniya and Qadisiyah Governorate. The lack of evidence creates a void in planning capacity for health authorities to plan for the availability of evidence-informed, targeted, and effective health promotion programmes [31]. Therefore, addressing this evidence gap is scientifically warranted and operationally urgent. By using Al-Diwaniya Educational Hospital as the basis for developing a KAP evidence base through an assessment of KAP among the community served by Al-Diwaniya Educational Hospital, the research team intends to produce a representative sample reflecting the demographics of the community because the hospital serves as the primary care provider for a number of different population sub-groups throughout the community being served.

The goals of this study are, therefore, to (1) assess the levels of knowledge, attitudes, and practices towards preventing NCDs among community residents who utilise the community health service providers operating through Al-Diwaniya Educational Hospital; (2) determine sociodemographic characteristics that relate independently to sufficient KAP levels; and (3) investigate the relationship of KAP to develop a better understanding of how KAP might be integrated into

preventative strategies for NCD-related prevention. The findings will be a contribution to the Iraqi and regional evidence base related to NCD-related prevention and an actionable source for healthcare providers, policymakers, and health educators who operate in resource-constrained settings..

Materials and Methods

The purpose of this study was to assess conditions seen in the outpatient clinic of Al-Diwaniyah Teaching Hospital (Al-Diwaniya), the main Tertiary care facility in Qadisiyah Governorate, situated in South-Central Iraq. Al-Diwaniya provides Inpatient, Outpatient and Emergency services, in many different specialties, to a potential catchment of more than 1.3 million persons, including those living in both urban and rural areas throughout the Governorate. Data were collected from January 1 to April 30, 2024. Data were collected primarily through outpatient clinics in Medical, General Surgery and Family Medicine to allow for recruitment of a heterogeneous, community-based (not only disease specific) sample.

The target population for this study was comprised of adult patients and their primary support persons (caregivers/emotional supporters) who visited the aforementioned outpatient clinics. Eligible participants included Iraqi nationals who were 18 years of age or older, mentally competent to provide consent and able to understand and complete the data collection tool in Arabic. Excluded were individuals who presented with an acute medical emergency; individuals who presented with significant cognitive impairment; individuals who were presenting with significant difficulties with communication; healthcare providers (who may have much higher levels of baseline knowledge); and individuals who previously participated in an associated study. Support people were included in the sample so that the sample would be reflective of the entire community and thus would have a greater degree of generalizability to the general population as opposed to being selected only from patients with a highly select group based on the disease or condition for which they sought care.

Sampling methodology: The minimum sample size needed was calculated using the formula for the cross-sectional survey study to determine the number of participants needed, $n = Z^2P(1-P)/d^2$ where $Z = 1.96$ using a 95% confidence level, $P=0.50$ using the assumed prevalence of adequate knowledge of NCD, in order to obtain maximum sample size based on no previous data was found in the local area, $d = 0.05$ acceptable margin of error (precision), and thus calculated having a minimum sample size of 384 participants. After adding an anticipated 10% for non-response and questionnaire incompleteness rates, the minimum sample size was re-adjusted to achieve a total sample size of 422 with ultimately 420 being full and usable completed questionnaires. Systematic random sampling was used by selecting every third eligible patient from the daily clinic attendance register providing equal opportunity for inclusion from each of the different days of the week and sessions in the clinic over the entire data collection period.

Development and validation of the questionnaire. A structured questionnaire was developed in English and then translated into Arabic by a professional translator. The back-translation was reviewed to ensure the correct meaning of the translated items matched the original meaning of the items before initial testing. The four-section questionnaire collected demographic data (age, sex, level of education, marital status, residential status (rural/urban), employment status, household income (monthly), and presence of known chronic disease) in the first section followed up by a total of 15 questions related to NCD knowledge including knowledge of the definitions of NCDs, primary risk factors for NCDs (tobacco, poor diet, lack of physical activity, and alcohol consumption), the role of preventive screening, and the consequences of NCDs. For each correct answer, a score of 1 was given and an incorrect or 'don't know' answer received a score of 0 for a total knowledge range of 0-15. Individuals scoring a total of ≥ 8 ($\geq 53.3\%$) on the questionnaire were classified as having an adequate level of knowledge about NCDs. Section C consisted of ten attitude items that were measured using a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). After inversion of negatively worded items, total attitude scores ranged from 10 to 50 and were considered to indicate a favourable attitude if the score was greater than or equal to thirty. Section D included twelve practice behaviours addressing dietary behaviours, physical activity, tobacco avoidance, alcohol abstinence, monitoring

weight, checking blood pressure and glucose, and obtaining preventive health screenings, which were scored on a scale of zero to two (0 = never, 1 = sometimes, 2 = regularly) for a total score of zero to twenty-four. If the score was greater than or equal to fourteen, the practice behaviour was considered adequate.

The validity of the questionnaire was assessed for face and content by a panel comprising seven subject-matter experts, including consultant internal medicine physicians, a public health specialist, and a clinical epidemiologist. The expert panel provided recommendations to improve the clarity of items, relevance to participants, and cultural appropriateness.

A pilot study involving thirty participants who would not be included in the primary analysis was conducted in order to assess the reliability of the instrument using Cronbach's alpha; reliability coefficients for the knowledge, attitude, and practice sections were respectively 0.79, 0.81, and 0.76, suggesting that the scales were internally consistent to an acceptable level.

Data collection was undertaken by trained data collection staff who were in their fourth or fifth year of medical school and were supervised by an experienced research coordinator using a face to face, interviewer-assisted process. This method was selected because many subjects had low literacy skills and therefore item non-response would be reduced. The researchers explained to each participant the study's objectives, obtained written and verbal informed consent and assured them that their answers would be kept confidential prior to each interview. The average amount of time for participants to complete each questionnaire was approximately 18–25 minutes. In addition, prior to beginning field work, the data collectors participated in a two-day training course focused on data collection process standardization, including the completion of inter-rater reliability evaluations, which yielded satisfactory results for selected knowledge items ($\kappa = 0.82$).

Statistical Analysis: The researchers entered all data into IBM SPSS Statistics version 26.0 (IBM Corp., Armonk, NY, USA) and verified all data by double-entry. The researchers reported descriptive statistics as frequencies and percentages for categorical variables and as means with standard deviations (SDs) for continuous variables. The researchers calculated chi-square tests (χ^2) to assess bivariate associations between sociodemographic characteristics and adequacy of KAP domains. Researchers included variables that demonstrated statistically significant association ($p < 0.25$) in bivariate analyses in multivariate binary logistic regression models using the backwards stepwise method (Wald) to identify independent predictors of adequate knowledge, attitudes and practices. Researchers expressed results as adjusted odds ratios (AORs) with 95% confidence intervals (CIs). Researchers assessed for multicollinearity among independent variables using the Variance Inflation Factor (VIF); all independent variables had VIFs < 2.5 , indicating no statistically significant multicollinearity was present. Researchers used the Hosmer-Lemeshow goodness-of-fit test to evaluate model calibration. Researchers calculated Pearson's correlation coefficients to assess the relationship between continuous KAP score data. Researchers defined the level of statistical significance as $p < 0.05$ (two-tailed).

Ethical Considerations: The researchers received ethical clearance for the study from the Institutional Review Board of Al Diwaniya Educational Hospital (Reference: ADEH-IRB-2023/117) and the Qadisiyah Health Directorate. The researchers complied with the principles of the Declaration of Helsinki in conducting the study. Participation was entirely voluntary and participants were informed they could withdraw from the study at any time without it affecting their clinical care. The researchers did not record any participant's identifiable personal data. All questionnaire data remained anonymous after completing the data-collection process and were stored in a password-protected electronic database and only accessible by the researchers. Participants were not given any compensation to participate in the study.

Results and Discussion

Results

The 420 respondents returned their questionnaires yielding an excellent response rate of 99.5%. The sociodemographics for the sample are shown in Table 1. Of the respondents, males made up just over half (52.4%) and had a mean age of 38.7 ± 12.3 years. The largest age range of respondents was that

of 18-35 years (40.0%). A total of 38.1% of the respondents completed some form of university or above and 20.0% completed either only a primary or no formal schooling. Urban dwellers were also represented well at 60.5%, and 32.9% of respondents reported having at least one pre-existing chronic condition diagnosed prior to being part of this study.

Table 1. Sociodemographic characteristics of study participants (N = 420)

Variable	Category	n (%)
Sex	Male	220 (52.4%)
	Female	200 (47.6%)
Age Group (years)	18–35	168 (40.0%)
	36–50	152 (36.2%)
	51–65	72 (17.1%)
	>65	28 (6.7%)
Education Level	Illiterate/Primary	84 (20.0%)
	Intermediate/Secondary	176 (41.9%)
	University/Postgraduate	160 (38.1%)
Residence	Urban	254 (60.5%)
	Rural	166 (39.5%)
Employment Status	Employed	214 (51.0%)
	Unemployed/Housewife	142 (33.8%)
	Student/Retired	64 (15.2%)
Known Chronic Disease	Yes	138 (32.9%)
	No	282 (67.1%)

Note: Percentages are column proportions.

The distribution of adequate levels of knowledge, attitude and practice (KAP) of healthy lifestyles based on stratification by key demographic variables is shown in Table 2. In summary, 54.3% of participants showed adequate levels of knowledge; 61.9% showed favourable attitudes; and 41.7% reported adequate levels of preventive practices. Knowledge related to the recommended amount of physical activity per week and to the health risks associated with secondhand tobacco use were the two most frequently missed areas of knowledge. Susceptibility to NCDs rated significantly lower than items that showed societal concern. The number of participants who engaged in regular physical activity, defined as engaging in at least 150 minutes of physical activity per week, was 27.4%; whereas there were 34.8% of respondents who reported regularly monitoring their blood pressure. Adequate knowledge varied based on educational level ($p < 0.001$), where a higher percentage of females obtained adequate KAP scores, and where significant differences were found based on residency ($p < 0.001$), and sex ($p = 0.048$).

Table 2. KAP domain adequacy by selected sociodemographic characteristics (N = 420)

Variable	Adequate Knowledge n (%)	Adequate Attitudes n (%)	Adequate Practices n (%)	p-value (Knowledge)
Overall	228 (54.3%)	260 (61.9%)	175 (41.7%)	—
Sex				0.048
Male	126 (57.3%)	138 (62.7%)	90 (40.9%)	
Female	102 (51.0%)	122 (61.0%)	85 (42.5%)	
Education Level				< 0.001
Illiterate/Primary	26 (31.0%)	42 (50.0%)	24 (28.6%)	
Intermediate/Secondary	96 (54.5%)	108 (61.4%)	68 (38.6%)	
University/Postgraduate	106 (66.3%)	110 (68.8%)	83 (51.9%)	
Residence				< 0.001
Urban	156 (61.4%)	164 (64.6%)	116 (45.7%)	
Rural	72 (43.4%)	96 (57.8%)	59 (35.5%)	

AOR = adjusted odds ratio; CI = confidence interval. p-values derived from chi-square tests.

Table 3 contains Multivariable Logistic Regression results. Results from multivariable logistic regression analyses of adequate knowledge show that adequate knowledge was identified as significantly related to (positive) predictors of developing a positive attitude related to health behaviour: university level of education (AOR = 3.41; 95% CI: 2.10 to 5.54), urban dwelling (AOR = 2.18; 95% CI: 1.44 to 3.31), younger age (AOR = 1.87; 95% CI: 1.21 to 2.90) and male gender (AOR = 1.42; 95% CI: 1.01 to 2.00). Adequate knowledge (AOR = 2.95) and favourable attitudes (AOR = 2.61) were the best predictors of developing adequate preventive practices. There was a statistically significant positive correlation between knowledge and attitude scores (Pearson's $r = 0.62$, $p < 0.001$) and between attitude and practice scores ($r = 0.54$, $p < 0.001$), indicating support for a sequential KAP to behaviour pathway.

Table 3. Multivariable logistic regression: predictors of adequate knowledge and adequate practices

Variable	AOR	p-value	95% CI
Predictors of Adequate Knowledge			
University/Postgraduate education	3.41	< 0.001	2.10 – 5.54
Urban residence	2.18	< 0.001	1.44 – 3.31
Age 18–35 years	1.87	0.005	1.21 – 2.90
Male sex	1.42	0.042	1.01 – 2.00
Predictors of Adequate Practices			
Adequate knowledge	2.95	< 0.001	1.89 – 4.60

Variable	AOR	p-value	95% CI
Favourable attitude	2.61	< 0.001	1.68 – 4.05
University/Postgraduate education	2.13	0.002	1.32 – 3.43
Known chronic disease	1.74	0.018	1.10 – 2.76

AOR = adjusted odds ratio; CI = confidence interval. Reference categories: education = illiterate/primary; residence = rural; age = >50 years; sex = female.

Discussion

In this cross-sectional research project, we analyzed knowledge, beliefs and action with respect to the prevention of noncommunicable diseases (NCDs) among individuals attending Al-Diwaniya Educational Hospital, located in the Qadisiyah governorate of Iraq. Our results reveal discouraging patterns of KAP deficits on the basis of coincident/crisscross studies conducted in the Middle Eastern and North African regions, while on average only half of the participants have adequate knowledge relative to NCDs and three-fifths of the participants reported positive belief systems toward NCDs; only 40% of the sample exhibited adequate preventive behaviours. The inability to translate positive belief systems towards NCDs into corresponding actions relative to preventive behaviours is a well established phenomena in the literature on health behaviour and warrants additional consideration in the context of other communities.

Across KAP studies, the observed rates of adequate knowledge level (i.e., 54.3%) among our participants are similar to other KAP studies from the region. A KAP study of knowledge of risk factors for NCDs among community members in Jordan reported an adequate knowledge level of 52% [32], while a KAP study examining knowledge of cardiovascular disease risk factors conducted in Saudi Arabia found a 49.6% adequate knowledge level [11]. These rates are remarkably dissimilar when compared to those found in higher income countries such as the UK, where the knowledge level of NCD risk factors was found to be 78% [33]. This finding demonstrates clearly that health knowledge is not simply the result of individual cognition, but also the result of an individual's characteristic socioeconomic and educational environment. The emerging knowledge gaps revealed by this study, particularly concerning the advised physical activity levels, the risks associated with passive exposure to tobacco, and the possibility of preventing cancer via lifestyle changes, will inform the areas of focus for the health education programs in Al-Diwaniya.

The practice results reflected the most alarming results, with only 41.7% of respondents reporting appropriate preventative health practices, which is most lacking in physical activity behaviours (27.4% reported being able to achieve the 150 minutes of recommended moderate-intensity aerobic activity from WHO) [34]. Studies have shown that Iraq is one of the most inactive populations in the world, where more than 60% of the population report to be physically inactive or excess sedentary behaviours [34].

The reasons behind the sedentary behaviours shared by many communities in Iraq are also due to the hot summer temperatures causing limitations on outdoor activity; security concerns, which historically have limited residents movement; urban patterns that do not focus on making the environment walkable or provide recreational opportunities; and cultural-related practices that restrict the ability of women to participate in full public physical activity [19]. All of the above require a focus to improve the level of physical activity; it is unlikely that only using informational strategies will have much of an impact on physical activity behaviour, without improving the physical environment to allow for the change to occur.

The dietary behaviours of respondents were severely inadequate, mirroring the overall transition in the region towards an increased intake of ultra-processed foods, refined sugars, and saturated fats; a reduced consumption of fruits, vegetables, and dietary fibre [35]. The food patterns now being consumed in Iraq and surrounding countries create a situation where overweight, obesity,

and metabolic syndrome continue to increase in rate of diagnosis, and will continue to occur. According to a national nutrition survey completed in Iraq, it was discovered that less than 18% of adults in the country are consuming the recommended amount of five servings of fruits and vegetables a day [5]. This is reflective of the same shortcomings seen in the current study involving dietary practices. Traditional Iraqi foods are often high-calorie and contain a lot of carbohydrates, which is also compounded by the increased use of imported processed products and street food, making it increasingly difficult to make dietary modifications.

The relationship between the level of education (specifically a university education versus primary/no education) and having adequate knowledge about non-communicable diseases (NCDs) as measured by an adjusted odds ratio (AOR) coefficient of 3.41 are consistent with numerous other surveys conducted all over the world and throughout the Middle East and North Africa region [27]. Education not only exposes individuals to information about health matters, but also provides the critical skills necessary to understand, evaluate and apply that knowledge. As such, this relationship highlights the importance of addressing the continuing education inequalities in Iraq, where adult literacy rates are still less than 70% in some rural areas, and where there are pronounced gender imbalances in the enrollment in secondary and post-secondary institutions [28]. The result is that the continuing educational inequalities translate into continuing disparities in health knowledge that will require targeted remedial action. The design of health education interventions for individuals with low levels of literacy must rely primarily on non-text-based communication modes such as visual materials, community health worker delivered verbal information and mass media campaigns that provide information in accessible formats.

The noted disparity in knowledge concerning NCDs between urban and rural areas (AOR 2.18) is an indication of the longstanding inequities in access to health information that exist between urban and rural areas in Iraq. Rural communities typically have less access to formal healthcare contacts - where health education is often delivered opportunistically - along with reduced opportunities for exposure to mass media channels through which prevention messages for NCDs are disseminated [30]. Additionally, areas in the Qadisiyah Governorate generally have much less educated populations, more poor people, and less access to preventative health care service availability. All of these variables compound the disadvantage in knowledge. Mobile health (mHealth) interventions and community health worker programs have shown promise across LMICs as effective interventions to improve NCD-related knowledge in rural populations and therefore have significant potential to bridge the gap in the context of Iraq [36].

The observed difference in NCD knowledge among genders - with males being more likely than females to have enough knowledge to be classified as having adequate knowledge (AOR = 1.42) - also needs to be contextualized. Typically there have been gender differences in health knowledge as identified in different studies both in Iraq and other countries throughout the region, but the direction and degree of these differences has consistently been shown to vary by disease domain and the context of the study [29]. In Iraq, women's ability to access formal health education is likely impeded due to their generally lower educational status, restricted independence (increased limitations on their ability to travel independently), and fewer visits to formal healthcare services than do men - especially in conservative rural communities where men are typically required to accompany women when attending a clinic. Therefore, while there are gender differences in the level of knowledge men and women possess about NCDs, those differences do not translate to a corresponding difference in attitude scores. It would seem therefore that the attitudinal orientations toward the prevention of NCDs are far less affected by one's gender than the knowledge one acquires about them and may therefore reflect a shared belief system regarding the importance of health and of family health [37]. The strong positive correlations between knowledge and attitude scores ($r = 0.62$) and between attitude and practice scores ($r = 0.54$) are in line with the theoretical assumptions underpinning the KAP framework, namely that knowledge acquisition will lead to attitudinal change, and that positive attitudes in turn support the uptake of preventative behaviours, although not completely. However, the significantly lower practice scores in comparison to both knowledge and attitude scores indicates that whilst knowledge and attitude are necessary, they are not sufficient conditions to bring about behavioural changes. This is

also consistent with the Health Belief Model's view of how perceived barriers and environmental limitations mediate the process of taking action based on health motivation. Therefore, intervention strategies in Al-Diwaniya must move beyond simply providing people with knowledge, and actively work to remove barriers that are preventing people from adopting preventative behaviours such as affordability of healthy foods, safe and accessible opportunities to be physically active, and the healthcare system's ability to provide preventative screenings and follow-up care [38].

The finding that participants who had been diagnosed with a chronic disease were 1.74 times more likely to exhibit adequate preventative practices is likely indicative of the motivation and behaviour which arise following a disease diagnosis – described in health behaviour theory as the 'teachable moment'. Clinical contact that occurs around diagnosing an illness provides structured opportunities for h/e have been diagnosed with a disease to receive physician or nurse directed education about disease prevention there would be less access to h/e would have otherwise without a diagnosis. This study has highlighted the need to embed systematic preventive counselling in the care of patients with existing non-communicable diseases (NCDs), while also indicating the necessity to provide similar educational interventions for people who have yet to be diagnosed in the community [39].

These results have broad implications for the health care systems of the Al-Diwaniya Educational Hospital. As an educational institution with a focus on outreach to the community, Al-Diwaniya is ideally situated to act as a hub for structured health education programming regarding NCDs through their outpatient clinics, community liaisons and medical student placements. Strategies such as regular health promotion programs in the waiting areas of clinics, the distribution of culturally appropriate, Arabic-language educational materials, and incorporation of structured, brief preventive counselling in routine clinical conversations may be easily implemented as low-cost, scalable points of entry to education and prevention. At a policy level, this study provides justification to support the strengthening of the primary health care prevention mandate for NCDs and the establishment of dedicated resources for community education/health in the Qadisiyah Governorate to meet the requirements of the World Health Organization and the Iraqi National NCD Strategy commitments [40].

Several limitations of this research should be noted. First, due to the cross-sectional design, there is no way to determine if knowledge increases precede or result from changes in attitudes and behaviour; longitudinal studies are needed to establish this relationship. Second, the use of only the hospital setting to sample participants, while convenient and reasonable for obtaining a representative cross-section of the community will introduce some bias related to health-seeking behaviours and have potentially created > KAP levels than for people in the community. Third, self-report data may contain errors due to social desirability, causing healthy behaviours to be over-reported. Fourth, this research was conducted at a single hospital in one governorate, thus limiting generalisability to other regions in Iraq. However, this research does establish a strong evidence base for Qadisiyah. Future research should use community sampling, objective measures of behaviour where possible and extend to other geographic areas in Iraq to facilitate comparison across regions.

Conclusion

In this study, there were considerable deficiencies regarding KAP regarding knowledge of NCDs, particularly around preventive practices of community members that use Al-Diwaniya Educational Hospital for services. There were more favourable attitudes to the prevention of NCDs than actual practice; thus, there is a need for multi-level interventions (beyond provision of information) to address the structural, environmental and sociocultural determinants of preventive behaviour. The demographic factors (educational attainment, urban residency, younger age and previous diagnosis of disease) were correlated with KAP adequacy and provide important criteria to target for the development of promotion activities. Al-Diwaniya Educational Hospital should consider implementing structured NCD health education as part of their outpatient services and utilise their academic role to help create a sustainable community health promotion capacity. The information

gained from this study will help provide much needed evidence base to assist in the planning of NCD prevention efforts at facility, governorate and national levels in Iraq.

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