

# Diabetes mellitus literacy in a regional community of a developed country

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**Summary.** *Background:* Prevalence of diabetes mellitus (DM) is on the increase. Yet discrepancies exist in research reports regarding the level of knowledge of the disease in ‘rural versus metropolitan communities’, and ‘developed versus developing countries’. This study examines the level of general knowledge of diabetes among adult community members of a regional city of Australia, whether it is comparable to reports from low-mid income countries. *Methods:* The study was designed to be a cross-sectional day-time-population survey. Major shopping centres were chosen for convenience sampling of community’s daytime population. A total of 315 participants’ (154 males and 161 females) responses were received. Data were analysed using SPSS – 20 software to identify differences between sub-groups of age stratifications, educational status, gender and the participants assumed knowledge. The participant’s average knowledge of diabetes symptoms and complications were also assessed. *Results:* The major finding is that the subgroup who claimed to know ‘very little’ showed equivalent knowledge levels with those who thought they had ‘considerable knowledge’. The females know more about diabetes management than males ( $P < 0.004$ ); level of knowledge increased with educational status ( $p < 0.01$ ). These observations were comparable with reports from developing countries. *Conclusions:* The limited knowledge of diabetes symptoms and complications in the population can be mitigating against early reporting of patients to diabetes clinics in the community. To ensure continuous decline in prevalence rates of diabetes and its complications, the ongoing efforts of diabetes awareness and educational programs need to be improved, particularly with regard to males and school children. ([www.actabiomedica.it](http://www.actabiomedica.it))

**Key words:** assumed knowledge, diabetes literacy, educational level, gender, rural communities

## Introduction

It is noted from the Australia Bureau of Statistics (ABS) that 60% of Australians lack basic health literacy (1). Health literacy is defined as the capability to seek, understand and act on health information (2, 3). Low health literacy is commonly seen in those with low education levels and can be improved by providing necessary educational programs (3). It is known that high levels of health literacy can influence early diagnosis and prevention of diabetes (4). In particular, poor health literacy is associated with poor diabetes control

as well as an inability to seek preventive measures (5, 6), which can lead to further complications. Diabetes requires constant education and constant medical care to achieve an adequate level of glycaemic control, especially as it promotes self-efficacy and self-care behaviors and glycemic control (7).

As in 2015, Orange ranked ninth in NSW diabetes hotspot list with 2030 individuals living with diabetes and an incidence rate of 5.1% (8). According to the Socio-Economic Indexes for Areas (SEIFA), Orange is a regional area with socioeconomically disadvantaged residents (9); and the disadvantages includes

health services (10, 11). This places an emphasis on the relationship between low education and health literacy as the individuals with low SES are less likely to access treatment options within the healthcare systems (6).

Therefore, given the incidence rate of diabetes and presumed limited knowledge of diabetic complications, prevention methods involving diabetes education need to be reviewed. It is known that such preventive education can enhance early diabetes detection and improve management (3, 5, 6). There is evidence that low socioeconomic status and residence in the urban area are independently associated with an increased risk of childhood diabetes (12), but this cannot be extrapolated for diabetes knowledge in rural areas. This led our research to evaluate these factors vis-à-vis exploring the research questions:

1. What is the level of general knowledge about diabetes among individuals in the central business district of the rural community of Australia?
2. Are there differences in age, gender and education subgroupings?
3. Do the people know as much as they perceive themselves?

## Method

This study was approved by the Human Research Ethics Committee of Charles Sturt University (protocol number: 400/2016/32). The study followed a cross-sectional survey design and adopted albeit restructured questionnaire from a published research (13). Further, based on the model that diabetes prevention activities in the Stockholm Diabetes Prevention Program were started with people from different walks of life (14) as well as following the methods involving study on nurses' knowledge (15, 16), convenience sampling of community members was chosen for the study. In this instance, study participants were 18 years old and above, recruited from various local shopping centres. The study excluded participants who resided out of the Orange 2800 postcode and those under the age of 18 years. Participants who were involved with the study were provided with an 11-point questionnaire, and information sheet. Implied consent was considered when

the questionnaire was submitted into a secured box on site.

The questionnaire focused on four main categories of knowledge of diabetes: types, cause, management, and complications. It was composed of two Likert scale questions, five multiple choice questions, two questions required participants to identify and write the correct answer and the last two questions required participants to either agree or disagree with a statement. These questions in the survey were inspired from similar studies (17-19), to suit a general population. A total of 315 participant responses were received (154 males and 161 females).

Data were analysed using SPSS - 20 software. Besides descriptive review, multivariate analysis of variance (MANOVA) was performed to identify differences between sub-groups of age stratifications, educational status, gender and participants assumed-knowledge. In particular, responses on knowledge were allocated values for each question answered based on either the Likert scale, or number of questions that the respondents got right. These values were compared between groups. For the third research question i.e. whether the people know as much as they perceive themselves, participants were sorted and sub-grouped based on their responses to Questionnaire #2 categories and responses to questionnaire #3 were analysed to determine the percentage of each subgroup.

## Results

Descriptive statistics of participants' responses by age and gender subgroupings are presented in Table 1. The participants ages ranged from 18 to 90 years old and 41.27% were 31-50 years old and had a secondary/high school education level. However, there is no difference between age-stratified groups ( $p > 0.05$ ; Table 1a). Out of 315 individuals who took part in the study, 154 were males and 161 were females. Average score on knowledge of symptoms, complications and types of diabetes in the population were 14%, 29%, and 54%, respectively (Table 1b). On gender difference, there are more females than males who indicated more correct answers about the management of diabetes. Further, the scores on knowledge of causes,

**Table 1.** Descriptive statistics of age and gender subgroupings**A: Age groups categorized into educational levels**

Age (years)	18-30	31-50	51-70	71-90	Total
Female/male*	33/27	66/65	49/54	13-Aug	161/154
Primary	1	5	8	4	18
High	33	64	60	15	172
Undergrad	15	23	18	0	56
Postgrad	10	28	13	2	53
Others	1	11	4	0	16
Total	60	131	103	21	315

\*Further described on 'part B' of table

**B: Gender differences in knowledge of diabetes mellitus**

Number of correct answers			
No of answers	Male	Female	Total
0	10	7	17
1	34	17	51
2	42	46	88
3	68	91	159
Total	154	161	315
% score on knowledge of diabetes mellitus			
Knowledge base	Male	Female	Average
Causes	37.7	40.2	39
Complications	25.8	32.9	29
Management	34.6	39.6	37
Symptoms	10.5	18.1	14
Types	48.2	59.9	54

complications, management, symptoms and types of diabetes among males were lower compared to females (Table 1b:  $p < 0.004$ ). This study therefore suggests that females in Orange have better knowledge of diabetes management in comparison to males.

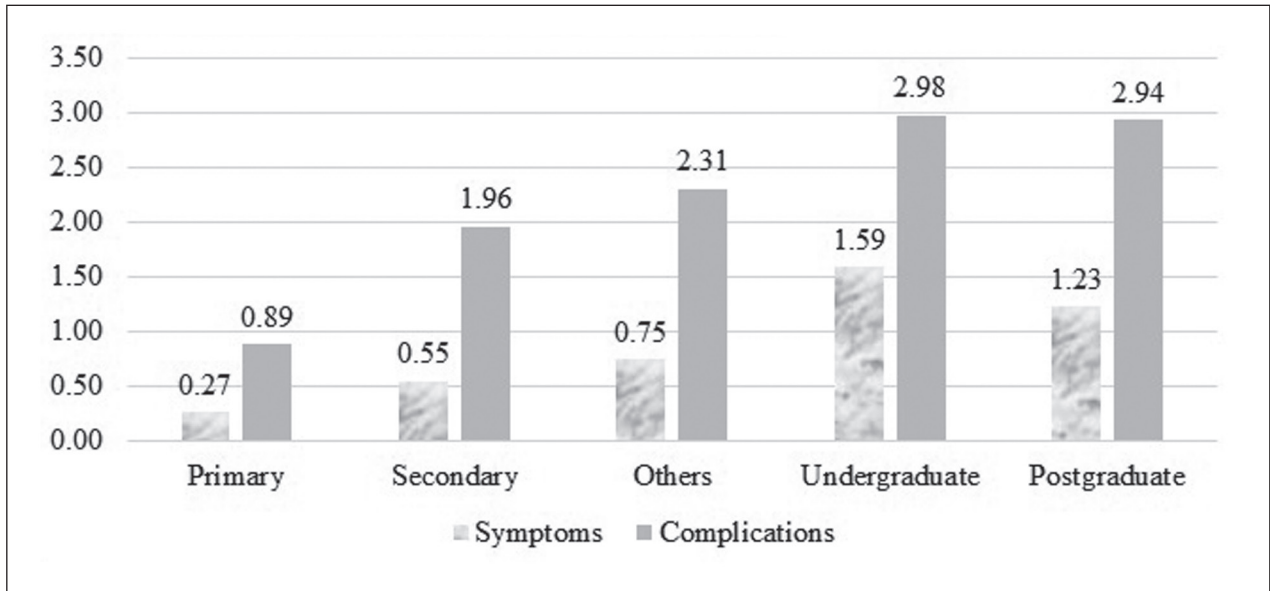
A correlation between the educational level and the average correctly identified responses of symp-

tom and complications ( $p < 0.01$ ) was found. Participants had to state the symptoms, which were marked according to the Diabetes Australia criteria that contained the most common 13 symptoms. Nine options were given for complications from which only seven were correct consisting of long and short term diabetes complications. The other two were distractors. Those who left the question blank or circled 'don't know', scored a zero. The result shows that the higher the education level, the more symptoms and complications participants they identified (Fig. 1).

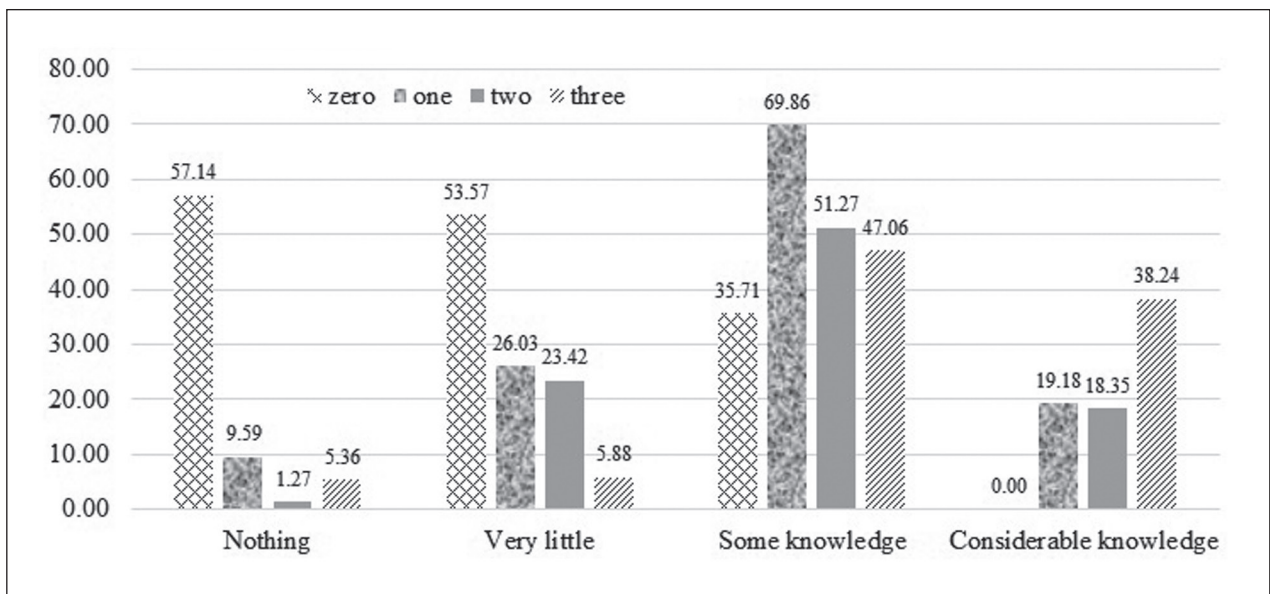
On analysis of participants' assumed-knowledge of diabetes based on the number of correctly identifiable diabetes causes, it was expected that individuals who claimed to have 'considerable knowledge' would correctly identify all itemised causes of diabetes. The observation was not the case, as no statistical significant difference was observed between groups. The participants who claim to have 'considerable knowledge' had lower diabetes knowledge when compared to those with 'some knowledge. Also, participants who claimed to have 'nothing' or 'very little' knowledge actually knew more than they thought (Fig. 2).

## Discussion

This study has investigated level of knowledge of diabetes, including its complications and symptoms as well as management, among a cross-section of the Orange community represented by a convenient sample people from various shopping centres. Most of the participants were 31-50 years old, but there is no statistical difference between age-stratified groups (Table 1a). In the systematic review that evaluated the relationship of health literacy to age, educational status and gender, it was noted that some studies had observed age as a contributing variable, while some others reported no significant differences, though several reasons were adduced for these discrepancies (20). A report from low-mid income community has also indicated no significant difference between age-groups (21). Therefore, the observation from this study regarding age agrees with some published literatures. Given that health literacy screening for older adults is also recommended as valuable (22), the observation of



**Figure 1.** Educational level vs. knowledge of diabetes symptoms



**Figure 2.** Assumed knowledge vs. correctness of diabetes symptoms

no statistical significant difference between age groups imply that diabetes education is equally needed across all age-groups in Orange community of NSW.

This study observed significant differences between educational status on level of knowledge of diabetes symptoms and complications (Fig. 1). This

observation is in agreement with the conclusion from systematic review of several studies that educational status correlates with better health literacy including diabetes (20). Another review of literature in Australia also established that successful interventions generally consist or depends on patient education (23). Further,

a study typically similar to ours from rural communities of low-mid income countries also affirms that better education is associated with higher diabetes knowledge (24). Indeed, educational status attenuates incidence of cardiometabolic diseases including diabetes (25). Combined with the observation and inference on age, what this report adds to literature is that diabetes literacy in regional communities of developed nations may be the same as in low-mid income countries.

This study also observed significant differences between gender groups (Table 1b), that the proportion of men who know about diabetes management is less when compared to the subpopulation of women. This is in agreement with observations from another study that investigated electronic health literacy among Hispanics with diabetes, which reported level of women to be significantly higher than those of men (26). The observation in the current study is at variance with other reports. For instance, a study of low-mid income sectors indicated no significant differences between gender groups (21), while another indicated more knowledge in men than women (27). However, the report of Lemes Dos Santos and colleagues agree with our observation that women have better general knowledge of DM (28). Therefore, what this study contributes is the additional data and information that, at least, women in Orange community of Australia are more knowledgeable on diabetes relative to men.

The third and most interesting finding of this study is from evaluation of stratified groups of participants' assumed-knowledge of diabetes. The results show that individuals who claimed to have considerable knowledge of diabetes do not necessarily have better knowledge than those indicating some knowledge. This can be argued that half of the study population (51.8%) constituting the "some knowledge" cohort may have skewed the results. However, it is probably more important to note that participants who claimed to have "no" or "very little" knowledge actually knew more than they thought. The implication is that diabetes education should be packaged with the awareness that some people know more than they claim, and vice versa. This inference is in agreement with a thesis report that even among nurses delivering diabetes care, perceived knowledge may be close to actual knowledge, but deficiency existed in terms of the required

accurate current knowledge (29). The relevance of this particular study lies in the idea that perceived risk, by those who assume to know considerable much, may underestimate actual risk (30). Moreover, there may be nurses who admit to know little, but are providing diabetes education (31); as there is low level of knowledge among public health students (13). In our opinion, this affirms the recommendation for diabetes education to focus on students of all levels as well as postgraduate and practicing healthcare personnel.

Further, it is arguable that beside socioeconomic status, urban residential status is a factor in health literacy (24). In Australia, while about 33% of the populace live in rural communities, the health status of the remote and rural dwellers are generally poorer compared to those in metropolitan cities (32). The hypothesis arising from this study is that although 'health status' may differ from, but dependent on 'health literacy'; health status among rural dwellers being generally poorer compared to those in metropolitan cities may be a factor of low health literacy in the rural communities.

### Limitation

This study is limited by duration as it was an integrated research training for undergraduates. Hence recruitment was 'convenience sampling' limited to Orange community and daytime. However, the findings contribute to the evolving discourse that is developing to support screening for health literacy skills in clinical care, which has the potential to influence changes to clinical practice in communities (2). Hence, the relevance of this study is that health promotion programs are equally needed in the communities of both developed and low-mid income countries to increase diabetic awareness.

### Conclusion

The major finding is the lack of general knowledge of diabetes complications, symptoms and management among males and females resulting in poor diabetes health literacy in the population. The limited

knowledge about diabetes symptoms and complications among the participants mitigate against early reporting of patients to diabetes clinics in the community. One of the contributions to literature is that diabetes literacy in regional communities of developed nations may be the same as in low-mid income countries. Another contribution to literature is the additional data and information that women in Orange, NSW are more knowledgeable on diabetes relative to men. A most interesting finding of this study is from evaluation of stratified groups of participants' assumed-knowledge of diabetes – whereby the results show that individuals who claimed to have considerable knowledge of diabetes do not necessarily know more than those that indicated little or no knowledge. To ensure continuous decline in prevalence rates of diabetes and its complications, the ongoing efforts of diabetes awareness and educational programs need to be improved. That is, the relevance of this study to health promotion is the provision of evidence of the fundamental need for education programs in the community to increase diabetic awareness. It is necessary for the focus of such educational need to be across age and educational strata, especially men and school to improve awareness and to reduce the prevalence of diabetes.

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