

# Empowering Mothers: Understanding Knowledge, Attitude and Practices Towards Glucose-6 Phosphatase Dehydrogenase (G6PD) Deficiency in Children

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## Abstract

Glucose-6-phosphate dehydrogenase (G6PD) deficiency, or “fava bean anemia,” is the most common genetic disorder, with an estimated 400 million people affected worldwide (Howes, 2012). This disorder can be detected through newborn screening. In the Philippines, the prevalence rate of G6PD deficiency is 1:58. This study is anchored on Bandura’s learning theory, which suggests that individual behaviors are learned through context. Roger’s diffusion of innovation theory also says that members of a social system accept innovation through four stages over time, which include knowledge acquisition, persuasion, decision, and confirmation. A survey questionnaire was constructed and validated by experts. To test the reliability, a pilot study was conducted on 20 respondents. The data gathered were treated using Cronbach’s Alpha Validity test. The questionnaire proved to be reliable, so it was floated to a total of 120 mothers who have one child who is G6PD deficient and was taken care of at home. These were the chosen respondents of the main study. All of the respondents answered the questionnaire completely. The data gathered were statistically treated using the following methods: frequency and percentage, weighted mean, ANOVA and T-test to test for any significant difference among variables. The findings in the study confirmed that (1) the respondents are knowledgeable about the signs and symptoms of the disease. However, they should be reminded that anemia is one of the disorder's signs and symptoms. (2) the respondents know about the disease's triggering factors. However, they should be aware that their children should not be given any medication without the doctor’s prescription. (3) the respondents were able to manage their child acceptably. However, they should be made aware of the importance of undergoing genetic screening to know who is the carrier.; (4) the respondents have a positive attitude towards the disease. However, the fact that this is one of their lifetime responsibilities as their children’s guardian/caregiver should also be reiterated. (5) regardless of the times the respondents got pregnant and successfully delivered a baby, they all have a positive attitude towards dealing with G6PD deficiency.

**Keywords:** *G6PD deficiency, quantitative, mothers of G6PD deficient children, Olongapo City*

## Introduction

Glucose-6 phosphate dehydrogenase (G6PD) is a housekeeping enzyme for all cells and is particularly important for the integrity and functioning of red blood cells (RBCs). Glucose-6-phosphate dehydrogenase (G6PD) deficiency, or “fava bean anemia,” is the most common genetic disorder, with an estimated 400 million people affected worldwide (Howes, 2012). As defined in Medline Plus – Online Medical Encyclopedia, Glucose-6-phosphate dehydrogenase (G6PD) deficiency is when red blood cells break down

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when exposed to certain drugs or the stress of infection. It is hereditary, which means it is passed down in families.

According to the World Health Organization (WHO) estimation, 7.5% of the world's population are carriers of G6PDd, and 2.9% are G6PD deficient. The geographical distribution of G6PD deficiency variants remarkably overlaps with historically malaria-endemic areas such as Africa, Asia, and the Mediterranean region. The selective advantage against malaria has enabled the persistence of G6PD deficiency in human populations, with many variants reaching high frequencies. Consequently, the prevalence of G6PD deficiency is high in malaria-endemic areas, ranging from 5% to 20% in Asia and Africa or even higher in some communities (Howes, 2012).

In a study conducted by Albagshi in 2022 in Saudi Arabia, a total of 48,889 patients were screened, which included 27,634 (56.5%) males and 21,255 (43.5%) females with a mean age of 1.93 + 3.98 years. The overall prevalence of G6PD deficiency was 25%, whereas it was 33.8% in the male subset and 13.2% in the female subset. Male sex was significantly correlated with G6PD deficiency. A total of 25,628 newborns were screened, with 14,219 (55.5%) males and 11,409 (44.5%) females who had a G6PD deficiency prevalence of 18.8%. A G6PD deficiency prevalence was 26% in males and 9.9% in females.

The NBS was integrated into the public health delivery system with the enactment of Republic Act 9288 or Newborn Screening Act of 2004. (Suerte, 2019)

According to National Institutes of Health – University of the Philippines, beginning January 2019, Expanded Newborn Screening is included in the Newborn Care Package of PHIC. It is a benefit package for essential health services of the newborn during the first few days of life. Through this package, the number of newborns screened and cases detected through screening increased, the importance of quality NBS services also increased.

In a pilot study conducted by Padilla in 2003, it was revealed that there is a significant incidence of G6PD deficiency in the Philippines. According to Department of Health, there is a significant increase in the number of confirmed cases of G6PD deficiency in the Philippines. As of December 2017, in 10,208,668 screened neonates, 176510 were screened positive for G6PD deficiency with a prevalence rate of 1:58.

In a local study conducted by Pamoceno, it was stated that in Pangasinan, one of the provinces in the Philippines, has a prevalence rate of G6PD deficiency that is comparable with the worldwide prevalence of the disease.

According to the National Institutes of Health, When the condition is identified through newborn screening, their mothers will continuously manage the deficiency at home. If properly managed, children with G6PD deficiency often can lead healthy lives. It is commonly known as fava bean anemia or favism because this deficiency increases the susceptibility of red blood cells to agents present in some medications and raw beans. Individuals with G6PD deficiency usually show no signs or symptoms of the condition until they are exposed to certain medications, foods, or infections. G6PD deficiency has implications for the safe treatment of malaria. Fortunately, symptoms of G6PD deficiency disappear once the trigger is recognized and removed.

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According to a journal by Hareke in 2019, “recognizing the potential for G6PD deficiency, clinicians can screen for the disorder and teach affected patients how to avoid triggers that result in harmful clinical manifestations”. With this, the early detection of G6PD deficiency among neonates will result in better outcomes. Children who test positive with the disorder can have a better life as long as they will be able to avoid triggers that might endanger them.

In a journal published by Baron in 2020, it was stated that mothers are the main people in maintaining family life; therefore, mothers are important to their families since child-raising responsibilities are part of their roles. The mother exhibits a devotion to the welfare of her child, known as altruism. *Altruism* is defined as giving up desires, wishes, wants, and valuables for the sake of something, achieving something with much effort and resources, and focusing on helping people without expecting anything in return.

Also based on the study conducted by Kasemy in 2019, “G6PD deficiency seems to be an important cause of neonatal jaundice. Mothers’ perceptions of both neonatal jaundice and G6PD deficiency were low. A mass health education program on both diseases is needed to ensure better and early detection, good timing of treatment, and better prevention of the triggering factors to ensure better health for children”. Most Filipinos still practice the old ways, especially in caring for their children. Unknowingly, they do practices that trigger the signs and symptoms of the disease to appear in children who tested positive because they are not aware of the things and practices to be avoided.

Mothers or significant others of children with the disorders must be knowledgeable and equipped enough to manage the case. Most children with G6PD deficiency do not show symptoms until exposed to certain medications or food triggers such as Soy products, fava beans, and legumes. As long as triggers are avoided, children with G6PD deficiency can live normal and healthy lives. (National Organization for Rare Disorders, 2021).

This prompted the researcher to conduct this study to assess the knowledge, attitude, and practices of mothers of children aged five years below who were confirmed positive for G6PD deficiency in Olongapo City.

### ***Theoretical Framework***

All researchers need to clarify the implicit theory in a more clearly defined manner. The theoretical framework allows researchers to consider their limitations and alternative theories that challenge their perspective.

This study used the knowledge, attitude, and practice (KAP) model to examine mothers’ knowledge, attitudes, and practices about the management of their child with G6PD deficiency at home.

The KAP model process originated from learning theory (Bandura, 1976) and diffusion of innovation theory (Roger, 1995). According to Roger (1995), members of a social system accept innovation through four stages over time. The stages include knowledge acquisition, persuasion, decision, and confirmation. In addition, Bandura (1976) suggested that individual behaviors are learned through social context. Also, Ajzen (1991) suggested that if an individual holds positive attitudes and behaviors, she/he would have better motivative intentions toward an issue.

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### ***Hypothesis***

Based on the identified problems listed above, and acknowledged research questions, the researcher expressed this supposition:

There is no significant difference between the respondent's extent of awareness when grouped according to profile.

### **Methods**

#### ***Research Design***

A descriptive quantitative design was used in this study. Calderon (2016), defined descriptive research as a purposive process of gathering, analyzing, classifying, and tabulating data about prevailing conditions, practices, processes, trends, and cause-effect relationships and then making adequate and accurate interpretation about such data with or without or sometimes minimal aid of statistical methods.

This design was utilized to gather data about the relationship between variables and interpret the result through statistical treatment.

Creswell (2012), explained the purpose of descriptive method is to find a detailed explanation and description about the object of the research systematically.

#### ***Research Instrument***

For this study, the researcher constructed a questionnaire survey to facilitate the collection of data and answer specific research questions. Also, this method is an efficient means to collect data, enabling the study to be completed within the time frame. The researcher utilized the questionnaire to evaluate further the percentage of mothers who have an idea about the disorder since they will be mainly answering questions that will gauge the extent of their awareness about G6PD deficiency.

#### ***Validity of The Instrument***

A pilot study conducted at Province X from March 01, 2023 to March 10, 2023. The respondents were 20 mothers who has a child aging five years old below and was positive for G6PD deficiency to assess the clarity, understandability, and comprehensibility of the instrument before it was administered to participants. The results confirmed that the questions were understandable, clear, and comprehensive. These 20 mothers were excluded from the main study sample. To evaluate the reliability of the instrument, Cronbach's Alpha was utilized. According to Collins (2007), Cronbach's alpha is a way of assessing reliability by comparing the amount of shared variance, or covariance, among the items making up an instrument to the amount of overall variance. The idea is that if the instrument is reliable, there should be a great deal of covariance among the items relative to the variance.

The questions included to assess the extent of awareness of the respondents were validated by experts in the field before being floated to respondents in conducting pilot study. The questionnaire used in this study was divided into three parts: knowledge, attitude and practice. The Cronbach's Alpha Reliability Test result for the first part was 0.743 with the internal consistency of "Acceptable", second part's result was 0.721 with the internal consistency of "Acceptable", and the third part's result was 0.850 with the internal consistency of "Good". This indicated that the questionnaire was reliable and can be used in this research study.

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### ***Statistical Treatment of Data***

The statistical treatment used for this study are the following:

1. *Frequency and Percentage*. According to Hayes, frequency is defined as how often that given value occurs in our data set, and percentage reflects the proportion of scores of a particular value. The percentage for a particular value is calculated by dividing the frequency of a given value by the total number of scores in the data set.
2. *Weighted Mean*. As defined by Taylor, weighted mean is a type of mean that is calculated by multiplying the weight associated with a particular event or outcome with its associated quantitative outcome and then summing all the products together. It is very useful when calculating a theoretically expected outcome where each outcome has a different probability of occurring.
3. *ANOVA*. As defined by Simkus in his article, ANOVA is a statistical test used to determine if there is a statistically significant difference between two or more categorical groups by testing for differences of means using a variance.
4. *T-test*. According to Bevans in an article she published in 2022, she defined this as a statistical test that is used to compare the means of two groups. It is often used in hypothesis testing to determine whether a process or treatment actually has an effect on the population of interest, or whether two groups are different from one another.

### **Results**

The significant findings of the study are summarized below:

#### ***Profile of the Respondents***

1. Most of the respondents are aged between 20 to 39 years old.
2. Most of the respondents have had two pregnancies already.
3. Most of the respondents successfully gave birth to two term babies.
4. Most of the respondents' children who was diagnosed to have G6PD deficiency are male.
5. Most of the respondents' children who was diagnosed to have G6PD deficiency are less than one year old.

#### ***Extent of awareness as perceived by mothers of children below five years old with G6PD deficiency***

1. Overall, with a computed weighted mean of 3.53, the mothers of children below five years old who tested positive to have G6PD deficiency were knowledgeable enough in handling or managing their child. They were aware of the basic information about the disorder, the signs and symptoms and the triggering factors that they need to avoid.
  2. The total computed weighted mean of the respondents' attitude towards handling G6PD deficiency is 3.71 or often practiced. Technically, this means that the things that the caregivers or the mothers must do in order to avoid the triggering factors that might harm their child is often practiced.
  3. The overall computed weighted mean of the attitude of mothers towards G6PD deficiency is 4.39 or agree. This indicated that their attitude towards G6PD deficiency is acceptable since they already know how they will be dealing with the problems that might arise due to the disorder. They are also aware of the possibilities that might happen in the future.
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***Significant difference between the knowledge, attitude and practices of the respondents when grouped according to Age***

1. *Knowledge*. The overall total P-value was computed to be 1.62. It was interpreted as not significant; therefore, null hypothesis is accepted.
2. *Practices*. The overall total P-value was computed to be 1.99. It was interpreted as not significant; therefore, null hypothesis is accepted.
3. *Attitude*. The overall total P-value was computed to be 2.09. It was interpreted as not significant; therefore, null hypothesis is accepted.

***Significant difference between the knowledge, attitude and practices of the respondents when grouped according to number of pregnancies***

1. *Knowledge*. The overall total P-value was computed to be 0.01. It was interpreted as significant; therefore, null hypothesis is not accepted.
2. *Practices*. The overall total P-value was computed to be 0.05. It was interpreted as significant; therefore, null hypothesis is not accepted.
3. *Attitude*. The overall total P-value was computed to be 0.09. It was interpreted as not significant; therefore, null hypothesis is accepted.

***Significant difference between the knowledge, attitude and practices of the respondents when grouped according to their number of times of successfully giving birth to a term baby***

1. *Knowledge*. The overall total P-value was computed to be 0.01. It was interpreted as significant; therefore, null hypothesis is not accepted.
2. *Practices*. The overall total P-value was computed to be 0.04. It was interpreted as significant; therefore, null hypothesis is not accepted.
3. *Attitude*. The overall total P-value was computed to be 0.12. It was interpreted as not significant; therefore, null hypothesis is accepted.

***Significant difference between the knowledge, attitude and practices of the respondents when grouped according to their child's age with G6PD***

1. *Knowledge*. The overall total P-value was computed to be 0.30. It was interpreted as not significant; therefore, null hypothesis is accepted.
2. *Practices*. The overall total P-value was computed to be 0.17. It was interpreted as not significant; therefore, null hypothesis is accepted.
3. *Attitude*. The overall total P-value was computed to be 0.72. It was interpreted as not significant; therefore, null hypothesis is accepted.

***Significant difference between the knowledge, attitude and practices of the respondents when grouped according to their child's sex with G6PD***

1. *Knowledge*. The overall total P-value was computed to be 0.00. It was interpreted as significant; therefore, null hypothesis is not accepted.
  2. *Practices*. The overall total P-value was computed to be 0.01. It was interpreted as significant; therefore, null hypothesis is not accepted.
  3. *Attitude*. The overall total P-value was computed to be 0.39. It was interpreted as not significant; therefore, null hypothesis is accepted.
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## Conclusion

Based on the findings of the study, the following conclusions are drawn:

1. Mothers of children diagnosed to have G6PD deficiency are knowledgeable about the signs and symptoms of the disease. However, they should be reminded that one of the signs and symptoms of the disorder is anemia. They should also be taught what are the things they will observe for a child who has anemia.
2. Mothers of children diagnosed to have G6PD deficiency are knowledgeable about the triggering factors of the disease. However, they should be made aware of that their children should not be given any medication without the doctor's prescription. They should also be reminded that not all medications can be given to their child who has G6PD deficiency.
3. Mothers of children diagnosed to have G6PD deficiency were able to acceptably do the management of their child. However, they should be made aware of the importance of undergoing genetic screening for them to know who among them is the carrier. Also, other caregivers aside from them should also be oriented about the do's and don'ts in caring for their child with G6PD deficiency.
4. Mothers of children diagnosed to have G6PD deficiency have a positive attitude towards the disease. However, the fact that this is one of their lifetime responsibilities as their children's guardian/caregiver should also be reiterated.
5. Regardless of the times the respondents got pregnant and successfully delivered a baby, they all have a positive attitude towards dealing with G6PD deficiency.

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