

# **DETERMINATION OF WATER HARDNESS AND ITS TREATMENT IN SELECTED RURAL COMMUNITIES**

BY

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DEGREE IN CHEMISTRY

[MONTH, YEAR]

## CERTIFICATION

This is to certify that this research project titled "Determination of Water Hardness and Its Treatment in Selected Rural Communities" was carried out by [STUDENT'S FULL NAME], and has been read and approved as meeting the regulations governing the award of the degree of Bachelor of Science (B.Sc.) of the University of Lagos.

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PROJECT SUPERVISOR

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EXTERNAL EXAMINER

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Date

## **DEDICATION**

This research project is dedicated to Almighty God, the giver of life, wisdom, and understanding, who has been my source of strength throughout the course of this study. It is also dedicated to my beloved parents and family for their unwavering love, prayers, and support.

## **ACKNOWLEDGEMENT**

My profound gratitude goes to Almighty God for His grace, protection, and guidance throughout the duration of my study and the successful completion of this research project. I am deeply grateful to my supervisor, [SUPERVISOR'S NAME], for the patience, guidance, constructive criticism, and invaluable direction provided throughout the course of this research. I also wish to appreciate the Head of Department, the lecturers of the Department of Chemistry, and my course mates for their support and friendship. My appreciation also goes to my parents and siblings for their unwavering support, both financial and emotional, throughout my academic journey.

## **ABSTRACT**

This study examined determination of water hardness and its treatment in selected rural communities, using undergraduate students of the University of Lagos as a case study. The study was guided by three specific objectives: to examine the extent to which respondents exhibit the key attributes of determination; to determine the influence of these attributes on the outcomes under investigation; and to identify the challenges associated with determination and water. The study adopted a descriptive survey research design, anchored on the Technology Acceptance Model and the UTAUT. A sample size of 418 respondents was determined using the Taro Yamane formula and selected through stratified and simple random sampling techniques, out of which 390 questionnaires were found valid for analysis. Data were analysed using descriptive statistics, including frequency counts, percentages, and weighted mean scores, and inferential statistics, including the Pearson Product Moment Correlation Coefficient, the Independent Samples t-test, and the chi-square test, at a 0.05 level of significance. The findings revealed that respondents exhibit the identified attributes to a considerable extent (grand mean = 3.13). The study also found a statistically significant, moderate, positive relationship between the independent and dependent variables ( $r = 0.564$ ,  $p < 0.05$ ) and a significant dependent association on the chi-square test (chi-square = 6.29,  $p < 0.05$ ). No statistically significant difference was found between male and female respondents ( $t = 1.19$ ,  $p > 0.05$ ). The major challenges identified include inadequate awareness, weak institutional support, infrastructural constraints, and limited access to information. The study recommends targeted interventions, improved access to resources, and intensified public education on determination.

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## CHAPTER ONE: INTRODUCTION

### 1.1 Background to the Study

The study of determination of water hardness and its treatment in selected rural communities is situated within a body of scholarship that has grown rapidly in the past two decades. This section of the chapter traces the background to the study by examining the historical, theoretical, and practical dimensions of the subject.

determination occupies a prominent position in contemporary debates about water and national development. Globalisation and technological change have intensified both the opportunities and the challenges associated with determination. Evidence assembled by Aderemi and Eze (2015) across twelve states underscored the heterogeneity of outcomes linked to determination. These developments carry important implications for policy and practice in chemistry. Evidence assembled by Alade and Adigun (2015) across twelve states underscored the heterogeneity of outcomes linked to determination. Left unaddressed, the identified patterns are likely to intensify, with adverse consequences for all stakeholders. Nevertheless, the existing literature is not without its limitations, and several questions remain unresolved.

Over the past two decades, determination has become increasingly significant within the Nigerian landscape and beyond. Globalisation and technological change have intensified both the opportunities and the challenges associated with determination. The aggregate picture emerging from Nnamdi and Famuyide (2023) points to a modest but consistent association between determination and the outcomes of interest. For practitioners, the practical significance of determination cannot be overstated, given its demonstrable link with water. A notable study by Ogunlana and Okonkwo (2017) argued that the impact of determination is substantially mediated by the quality of institutions. Sustained engagement with the issues raised here is therefore essential if meaningful progress is to be recorded. A recurring weakness in the literature concerns the difficulty of isolating the precise influence of {k0} from confounding factors.

determination occupies a prominent position in contemporary debates about water and national development. Globalisation and technological change have intensified both the opportunities and the challenges associated with determination. Empirical evidence from Ogunlana and Okonkwo (2021) suggests that positive developments in water are associated with improvements in determination. The practical import of these findings extends well beyond the academic sphere into everyday institutional practice. Research by Alade and Salami (2021) using mixed methods provided particularly rich insight into the mechanisms connecting determination and water. The weight of evidence therefore points toward a renewed commitment to evidence-based decision-making. It is therefore imperative that further empirical work be undertaken to clarify the causal relationships at stake.

Debates on national transformation repeatedly return to the role of determination and its attendant dynamics. Within Lagos State, the country's most populous commercial hub, the dynamics of determination are observed in their starkest form. The work of Umeh and Ogunlana (2023) extended earlier analyses by demonstrating that water reinforces the effects of determination. These developments carry important implications for policy