

UNIVERSITI TEKNOLOGI MARA

**SELECTED HEAVY METALS IN DRINKING
WATER SUPPLY AND ITS HEALTH EFFECTS**

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ABSTRACT

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The study is a cross-sectional study of the drinking water supply in the residential area of Old Town, Petaling Jaya. Samples of water from 41 houses were taken by simple random sampling. Measurement of cognitive performance was done through the administering of the Wechsler Intelligence Scale for Children IV (WISC IV) test to a sample size of 51 people, on the population of children (8 to 14 years old) living in the study area who consumes the unfiltered drinking water supply from their homes. Measurement of gastrointestinal health effects was done through the administration of questionnaires to a sample size of 51 people, and sampling was carried out on the population of people living in the residential area who consumes the unfiltered drinking water supply from their homes. Both the WISC IV test and the questionnaire distribution were carried out to determine the impact to health (health effects). Overall, a large majority of 95.1%, which is 39 out of the 41 samples tested, exceeded the permissible level for lead concentration in drinking water supply. No violations of copper concentration in the drinking water samples were found. Findings for overall respondents of all ages show that the current lead concentrations in drinking water have no significant correlation with the overall PSI (IQ) scores, with a p-value of 0.152, in which $p > 0.05$ and very poor correlation, $R = 0.203$. Analysis according to age groups, show that for 10 year olds the correlation is also not significant, with a p-value of 0.135, in which $p > 0.05$, and $R = 0.356$ showing poor correlation of lead and PSI (IQ) scores. For the analysis of 12 year olds the concentration of lead with PSI (IQ) scores show poor negative correlation of $R = -0.141$ which is not significant at a p value of 0.63, with $p > 0.05$. Present copper concentration in the drinking water supply does not show significant association with evident health effects, with the association value of $\chi^2 = 0.111$ and a p-value of 1.00 in which $p > 0.05$, which also shows no significant association.

CHAPTER 1

INTRODUCTION

1.1 Background Information

Lead is a highly ductile and malleable element usually selected as choice material for a large number of products, including glass, paint, pipes, and building materials due to its unique properties. The increased and wide use of Lead has resulted in elevated lead concentrations in the ecosystem. This is especially in locations where Lead is mined, smelted and refined, where industries use the metal, and also in urban-suburban complexes, in which the environmental Lead levels are greatly increased (Ho, 2005).

Because Lead is ubiquitous and is toxic to humans at high doses, levels of exposure encountered by some population groups constitute a serious public health problem (U.S. NRC, 1980).

Copper is a transition metal widely distributed in the elemental states, in sulphides, arsenites, chlorides and carbonates (Xiao et. al, 2006).

Copper is sorbed more strongly by organic matter and at lower pH (Chrosniak et. al, 2005).

It is found in many mixtures of metals, called alloys, such as brass and bronze. Many compounds (substances formed by joining two or more chemicals) of copper exist, either naturally occurring minerals or manufactured chemicals (ATSDR, 2004).

Although copper is an essential nutrient required by the human body in very small amounts, it can potentially cause adverse health effects when exposed to it at levels above 1.3ppm. Use of water that exceeds such level after many years could cause