



Title	The Impact of Water, Sanitation, Hygiene and Nutrition on Children ' s Health Outcomes in an Urban Slum in Bandung, Indonesia [an abstract of dissertation and a summary of dissertation review]
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Citation	北海道大学. 博士(保健科学) 甲第15827号
Issue Date	2024-03-25
Doc URL	http://hdl.handle.net/2115/91945
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Type	theses (doctoral - abstract and summary of review)
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学位論文内容の要旨

博士の専攻分野の名称：博士（保健科学）

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学位論文題名

The Impact of Water, Sanitation, Hygiene and Nutrition on Children's Health Outcomes in an
Urban Slum in Bandung, Indonesia

(インドネシア・バンドンの都市スラムにおける水、衛生、栄養が子どもの健康に及ぼす影響)

Diarrhea and malnutrition remain significant global health concerns, posing a substantial risk to children. This health burden is particularly pronounced in low and middle-income countries, including Indonesia. Basic health survey reported that around 12.3% and 28.7% of Indonesian children are at risk of diarrhea and stunting, respectively. This situation may arise due to inadequate water, sanitation, and hygiene (WASH) facilities, unhygienic behavior, and lack of knowledge. During the COVID-19 pandemic, there was an expectation that this condition would improve as households followed health protocols. However, the connection between WASH levels and their impact on child health was not fully revealed, especially in urban slums. The objectives of this research were to: 1) investigate the effect of handwashing techniques on reducing *E. coli* on children's hands, 2) assess handwashing behavior and facilities during the COVID-19 pandemic and their correlation with diarrhea incidence among children, and 3) explore factors and perspectives about malnutrition related to WASH among children and mothers.

The research was conducted in Bandung, West Java, Indonesia, comprised three studies: Study 1 observed 137 primary school students, focusing on handwashing practices and *E. coli* detection. Study 2 included 238 mother-student pairs, observing WASH facilities and handwashing behavior and diarrhea. Study 3 used a mixed-methods approach with 273 students

and mothers for quantitative analysis and 47 mothers for qualitative study. Methods included questionnaires, anthropometric measurements, interviews, and focus group discussions. Data processing for all studies used JMP SAS version 17 and MAXQDA software.

A school-based study revealed that children's handwashing techniques were ineffective in fully removing *E. coli* contamination. Key factors for reducing *E. coli* included cleaning between fingers, using soap for over 10 seconds, and drying hands with a single towel. However, children tended to overlook specific areas, highlighting the need for improvement. These findings align with a study on handwashing behavior, which observed a significant increase in handwashing frequency among children during the COVID-19 pandemic. Unfortunately, this surge did not lead to improved handwashing techniques, and there was insufficient access to water and soap, contributing to a higher incidence of diarrhea. Malnutrition factors were explored, revealing that 13.1% and 19.7% of children experienced stunting and wasting, respectively. Malnutrition correlated with dietary intake, knowledge of WASH, and the WASH Index. Food insecurity was prevalent, posing a significant barrier to food access.

The study highlights a knowledge-practice gap in WASH and poor hygiene practices among children. The results emphasize the pivotal role of WASH behavior and facilities in addressing child health issues. Key findings underscore the need for a comprehensive, localized, and community-based approach to tackle child health problems. This underscores the importance of not only disseminating knowledge but also fostering practical changes and sustainable initiatives within local communities to positively impact child health outcomes.