Abstrak

Ketersediaan air minum aman dan terjangkau bagi semua masyarakat secara merata merupakan salah satu target *Sustainable Development Goals* (SDG). Kualitas air yang kurang memadai dapat meningkatkan risiko penularan penyakit yang berasal dari air terhadap populasi manusia. Berdasarkan data Studi Kualitas Air Minum Rumah Tangga (SKAMRT) tahun 2020, akses air minum aman dari parameter *E. coli* hanya sebesar 26%. Informasi tersebut belum menggambarkan seberapa besar risiko kesehatan masyarakat yang mungkin terjadi akibat paparan *E. coli* dalam air minum rumah tangga di Indonesia. Penelitian ini bertujuan untuk memperkirakan risiko kesehatan masyarakat akibat paparan *E. coli* dalam air minum rumah tangga pada *point of access* (POA) dan *point of use* (POU), serta mengidentifikasi faktor lingkungan yang berhubungan dengan kualitas air minum berdasarkan parameter keberadaan *E. coli*.

Penelitian ini menggunakan data sekunder hasil SKAMRT 2020 dengan jumlah responden 21.829 rumah tangga di Indonesia. Metode *Quantitative Microbial Risk Assessment* (QMRA) digunakan untuk memperkirakan risiko kemungkinan infeksi dan kejadian diare tahunan akibat paparan patogen dalam air minum rumah tangga. Uji regresi logistik digunakan untuk mengidentifikasi faktor lingkungan yang berhubungan dengan kualitas air minum rumah tangga. Patogen referensi yang digunakan pada analisis QMRA adalah *E. coli* O157:H7, *Campylobacter*, *Cryptosporidium*, dan rotavirus. Variabel terikat dalam penelitian ini adalah kualitas air di POA dan POU, sedangkan variabel bebas terdiri dari jenis sumber air minum, pengolahan, fasilitas sanitasi, kondisi penyimpanan air, dan regional.

Perkiraan risiko infeksi tahunan di POA melebihi referensi WHO, sedangkan di POU hanya *Cryptosporidium* yang berada di bawah referensi. Perkiraan beban penyakit diare total di POA dan POU masing-masing sebesar 0,177 dan 0,095 DALY per orang per tahun dengan kontributor terbesar berasal dari *E. coli* O157:H7 dan dari jenis sumber air yaitu air isi ulang. Faktor yang secara signifikan (p<0,001) berhubungan dengan kualitas air minum rumah tangga adalah kualitas air di POA, pengolahan, penempatan wadah penyimpanan air, penggunaan tutup penyimpanan saat tidak dipakai, keberadaan tanda kontaminan, dan regional. Perkiraan risiko kemungkinan infeksi dan beban penyakit diare akibat paparan patogen dalam air minum melebihi target referensi WHO. Peningkatan infrastruktur penyediaan air, perluasan akses jaringan air perpipaan, pengawasan yang lebih ketat bagi penyedia air minum isi ulang, dan edukasi higiene sanitasi pada anak sekolah perlu dilakukan, agar masyarakat memperoleh kualitas air yang baik.

Kata Kunci : QMRA, *E. coli*, DALY, air minum, SKAMRT

Abstract

One of the Sustainable Development Goals is to ensure that everyone has access to safe and affordable drinking water. Poor water quality can raise the risk of water-borne disease transmission to humans. According to the 2020 Indonesian Household Drinking Water Quality Study (SKAMRT), just 26% of households surveyed have access to safe drinking water free from E. coli. This information does not currently explain the magnitude of the public health risk that could occur as a result of E. coli exposure in Indonesian household drinking water. The goal of this study is to estimate public health risks due to exposure to E. coli in household drinking water at points of access (POA) and points of use (POU), as well as identify environmental factors related to drinking water quality based on the presence of E. coli parameters.

This study employs secondary data from the 2020 SKAMRT results, with a total of 21,829 Indonesian households as respondents. The quantitative microbial risk assessment (QMRA) method was used to quantify the potential risk of infection and the annual incidence of diarrhea caused by pathogens in household drinking water. A logistic regression test is used to determine environmental factors associated with the quality of household drinking water. The reference pathogens employed in the QMRA analysis were E. coli O157:H7, Campylobacter, Cryptosporidium, and rotavirus. The dependent variable in this study is the quality of water at the POA and POU, whereas the independent factors are the type of drinking water sources, treatment, sanitation facilities, water storage conditions, and regional.

The estimated annual probability of infection risk in POA exceeds the WHO reference, whereas in POU, only Cryptosporidium is below the reference. Estimates of the total diarrheal disease burden in POA and POU are 0.177 and 0.095 DALY per person per year, respectively, with the largest contributors coming from the reference pathogen E. coli O157:H7 and drinking water sources coming from refill water. Factors that were significantly (p<0.001) related to household drinking water quality were water quality at the POA, household water treatment, placement of water storage containers, use of storage lids when not in use, presence of contaminants, and regional. The estimated yearly chance of infection and diarrheal disease burden attributable to microorganisms in drinking water exceeds WHO reference targets. Improving drinking water supply infrastructure, expanding access to piped water networks, operational supervision of refill drinking water providers, and early education of schoolchildren about the proper processing and storage of drinking water are all necessary for the public to have safe drinking water.

Keywords: *QMRA, E. coli, DALY, drinking water, SKAMRT*