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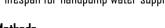
## Research Brief

Risk factors associated with rural water supply failure: A 30-year retrospective study of handpumps on the south coast of Kenya

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#### Rationale

- An improved understanding of water supply failure in rural sub-Saharan Africa will be critical to achieving the global goal of safe water for all
- The aim of the study was to identify factors that influence risk of failure and operational lifespan for handpump water supplies





 The study site was Kwale County in Kenya, which played host to the first large scale deployment of the Afridev handpump by way

of a programme that installed 550+ handpump-equipped boreholes between 1983 and 1995



Full paper available at this link: https://doi.org/10.1016/
j.scitotenv.2017.12.302
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- A retrospective cohort study design was employed: field data were collected to establish time to failure for handpumps, and this information was then matched with data from original installation records
- Three survival analysis techniques were used to identify risk factors for water point failure: (a) Kaplan-Meier estimates, (b) Cox proportional hazards regression, and (c) accelerated failure time models

#### Results

- Of the 337 water points that were matched with data from the original installation records, the average age was 24 years and 64% were found to be functional
- Risk of failure and operational lifespans were significantly associated with salinity, static water level, geology and distance to spare parts:
  - ♦ Salinity: An increase in 100 μS/cm was associated with a 2% increase in risk of failure and a 2% reduction in lifespan
  - Static water level: A 1 metre increase in groundwater depth was associated with a 3% increase in risk of failure and a 2% reduction in lifespan
  - ♦ **Geology:** An unconsolidated sand aquifer was associated with a 70%-108% increase in risk of failure and a 29-34% reduction in lifespan
  - Distance to spare parts: A 1km increase in distance to spare part suppliers was associated with 2% increase in risk of failure and a 2% reduction in lifespan

#### **Implications**

- Post-construction support mechanisms should seek to level the playing field by mitigating the impact of more challenging environmental and geographical conditions
- Unfavourable groundwater quality should be assessed to determine if a site is suitable for investment
- Further studies are needed to better understand the causal pathways that underlie identified risk factors
- Survival analysis and longitudinal study designs could be applied more widely to increase the rigour of water point sustainability assessments







