

Article

Monitoring the Impact of National Sanitation and Hygiene Programme for Rural Communities in Chamwino (Tanzania)

Beatriz González-Rodrigo ^{1,*}, Ana Esteban-Zazo ^{2,*}, Cristina Vela-Plaza ², Esnati James Chaggu ³ and José Antonio Mancebo ⁴

¹ Department of Ingeniería y Gestión Forestal y Ambiental, E.T.S.I. Civil, Universidad Politécnica de Madrid, 28014 Madrid, Spain

² ONGAWA, Engineering for Human Development, 28014 Madrid, Spain; cristina.vela@ongawa.org

³ Department of Environmental Engineering, Ardhi University, Dar es Salaam P.O. Box 35176, Tanzania; esnatchaggu@hotmail.com

⁴ Department of Ingeniería Mecánica, Química y Diseño Industrial, E.T.S. de Ingeniería y Diseño Industrial, Universidad Politécnica de Madrid, 28014 Madrid, Spain; ja.mancebo@upm.es

* Correspondence: beatriz.gonzalez.rodrigo@upm.es (B.G.-R.); ana.zazo@ongawa.org (A.E.-Z.)

Citation: González-Rodrigo, B.; Esteban-Zazo, A.; Vela-Plaza, C.; Chaggu, E.J.; Mancebo, J.A. Monitoring the Impact of National Sanitation and Hygiene Programme for Rural Communities in Chamwino (Tanzania). *Water* **2022**, *14*, 735. <https://doi.org/10.3390/w14050735>

Academic Editors: Panagiotis Karanis, Layla Ben Ayed, Eleni Golomazou, Patrick Scheid, Ourania Tzoraki, Anna Lass and Muhammad Shahid Iqbal

Received: 28 January 2022

Accepted: 7 February 2022

Published: 25 February 2022

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2022 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).

Abstract: The Sustainable Development Goals promulgate access to sanitation and hygiene for all and the end to open defecation in the framework of the human right to sanitation. Tanzania has one of the lowest levels of access to sanitation, with increasing open defecation. Ending open defecation has been identified as a top priority for reducing global inequalities in WASH (water, sanitation and hygiene). In this context, the coordinated work of NGOs, universities and governments developed a hygiene and sanitation programme (UMATA), whose methodologies and lessons learnt are ready to be scaled up. This research analyses the information collected from more than 21,000 households and discusses the challenges of monitoring and tracking the degree of achievement of the Sustainable Development Goals and the human right to sanitation. A characterisation of the hygiene and sanitation situation and the degree of adoption of different latrine types was assessed before (baseline) and after (follow-up) the implementation of the UMATA programme using the WHO/UNICEF JMP (Joint Monitoring Programme for Water Supply, Sanitation and Hygiene) metrics and approach. This allowed evaluating the efficacy of the strategy implemented in Tanzania to reduce open defecation that led to a decrease from 40.7% to 9.70% in the monitored period. Finally, we discuss the critical economic factors affecting the adoption and sustainability of improved sanitation systems.

Keywords: open defecation; Sustainable Development Goals; sanitation ladder; 2030 Agenda; JMP; Sub-Saharan Africa

1. Introduction

1.1. Sanitation and Hygiene in the Framework of Sustainability and Human Development

After more than 20 years of international discussion, the United Nations (UN) General Assembly recognised access to clean water and sanitation as a human right in Resolution A/RES/64/292 on 28 July 2010 [1]. The Committee on Economic, Social and Cultural Rights had already defined the right to water in General Comment No. 15, UN Doc. E/C.12/2002/11 [2]. The human right to sanitation (HRTS) was not recognised by the UN General Assembly as an independent and autonomous human right till the end of 2015, through resolution A/RES/70/169 was published in February 2016 [3]. HRTS was included in the 2030 Agenda for Sustainable Development adopted by UN Member States on 25 September 2015. The Agenda comprises 17 Sustainable Development Goals (SDGs) and 169 targets. SDG target 6.2 relates to sanitation and hygiene and is far more ambitious than the previous Millennium Development Goal target 7c. SDG target 6.2 incorporates

universal access to sanitation and concepts of equity, accessibility, affordability, non-discrimination and gender, in line with HRTS categories. Nevertheless, it does not include some principles such as access to information, participation and accountability [4].

Globally one in three people lack access to adequate sanitation facilities [5]. Up until 2017, 2.3 billion people had no access to improved sanitation and 12% of the world's population practiced open defecation (OD) [6]. The result was widespread mortality and morbidity, especially among children [7–9], and social marginalisation. Women and girls are the most vulnerable, as poor sanitation exposes them to the risk of assault. When girls do not have access to clean and safe toilets, they are more likely to have low attendance and drop out of school.

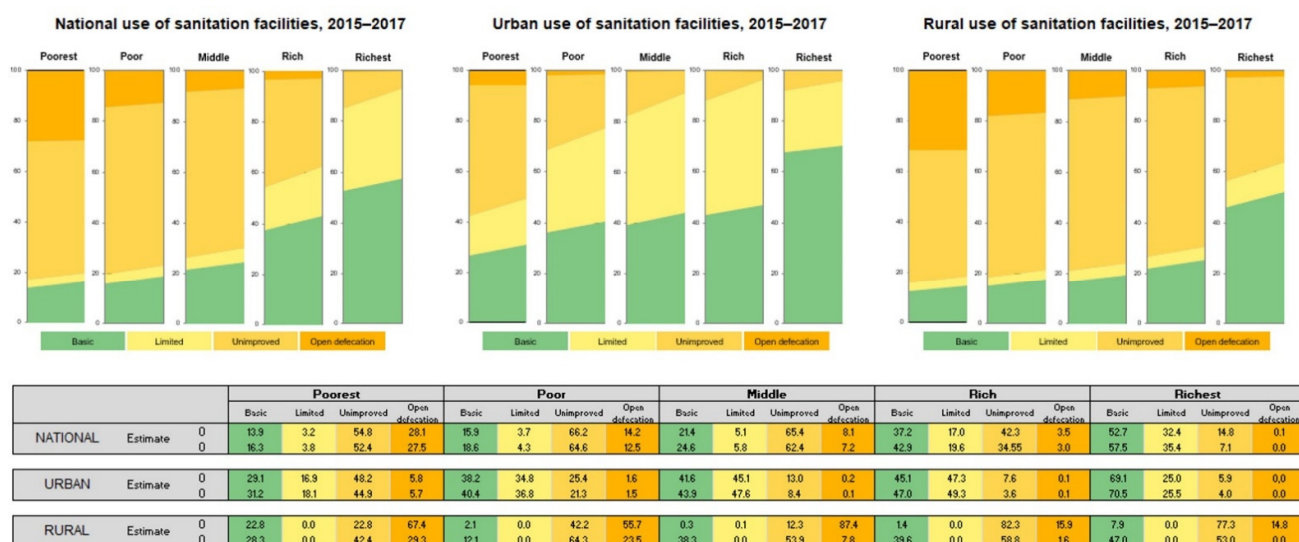
Furthermore, millions of children suffer from malnutrition, low school attendance rates and economic losses due to diarrhoeal diseases that are preventable by adequate sanitation and hygiene [10]. Poor disposal of human excreta leads to the spread of intestinal parasites, which affect 1.5 billion people around the world [10], and causes transmission of diseases such as schistosomiasis, cholera, typhus, and many other infectious diseases that affect hundreds of millions of people. It is estimated that poor sanitation and hygiene account for 7% of deaths in low- and middle-income countries [10]. In Tanzania, diarrhoea is the third leading cause of mortality in children under 5 years of age [11]. The populations most affected by poor sanitation live in extreme poverty, particularly in peri-urban and rural areas. The elimination of diseases will not be achieved until all affected populations have access to effective sanitation, sewage treatment and disposal [12].

The World Health Organisation (WHO) and United Nations Children's Fund (UNICEF) Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (JMP) has been producing regular estimates of national, regional and global progress on drinking water, sanitation and hygiene (WASH) since 1990 [6]. The JMP service "ladders" are a well-established concept within the water and sanitation sector extensively used to illustrate how people can move from simple sanitation solutions to more advanced ones by moving up rung-by-rung on a ladder [13,14]. According to JMP data in 2015, five billion people used an improved sanitation facility that was not shared with other households, thus classified as having at least basic sanitation services [6]. The population that has access to at least basic sanitation services is 68% globally compared to 28% in sub-Saharan Africa [6]. The practice of OD is much more common in rural areas of sub-Saharan Africa, an estimated 35% among rural households, in contrast to 8% among urban households [13,15].

Different adaptations of the methodology called community-led total sanitation (CLTS) are employed for eradication of OD. CLTS was designed in 2000 in the Rajshahi District of Bangladesh to advocate changes in the role and commitment of development institutions, promoting local empowerment, participation and mobilisation, as well as enabling villagers to analyse their sanitation and waste situation [16]. This methodology brings about collective decision-making to stopping OD. Communities are facilitated to conduct their own appraisal and analysis of the OD situation and take their own action to become open defecation-free (ODF) villages. At the heart of CLTS lies the recognition that merely providing toilets does not guarantee their use, nor result in improved sanitation and hygiene. CLTS focuses on the behaviour change to ensure real and sustainable improvements in investing in community mobilisation instead of hardware and shifting the focus from toilet construction for individual households to the creation of ODF villages. By raising awareness that as long as even one individual continues to defecate in the open, everyone is at risk of disease, CLTS triggers the community's desire for collective change, propels people into action and encourages innovation, mutual support and appropriate local solutions, thus leading to greater ownership and sustainability. The CLTS methodology unites the community to commit to using sanitary latrine and hygienic behaviour practice. The community understands that the process is a shift towards a zero-subsidy approach rather than provision of money to construct latrines [17].

1.2. Hygiene and Sanitation in Tanzania

Tanzania is a country with a rapidly increasing population that has grown from 30.2 million in 2000 to 55.5 million people today, while 67.7% of the population live in rural areas [18]. Between 2000 and 2020, the proportion of Tanzanians practicing OD increased from 9.6% to 10.9%; though the prevalence of OD in the urban areas is stable (1.4%), in rural areas, it has significantly increased to 16.1% [6,18,19] (Figure 1). These percentages vary from one region to another. In Northern Tanzanian regions, OD is becoming more prevalent, while in Southern regions, OD prevalence remains relatively low [20]. In the Dodoma Region, OD was estimated at between 21% and 30% in 2010 [20] and 6.9% in 2016 [19]. The available sanitation solutions in rural areas in Tanzania are few and enjoy limited adoption by vulnerable population groups. The range of commercial sanitation products is limited, and families do neither get access to nor adopt them because sanitation is not considered a primary need and the costs are too high for most families. This is one of the reasons why sanitation coverage in Tanzania keeps going down and is one of the lowest in the world, with only 12% of the population having improved sanitation facilities [21], with increasing consequences in terms of health, education and development [6]. This situation means that Tanzania is failing in Goal 6, as it does in other goals, being in the 131st position out of 157 in the SDG Global Rank [22] and neglecting the HRTS.



Basic: Use of improved facilities which are not shared with other households.

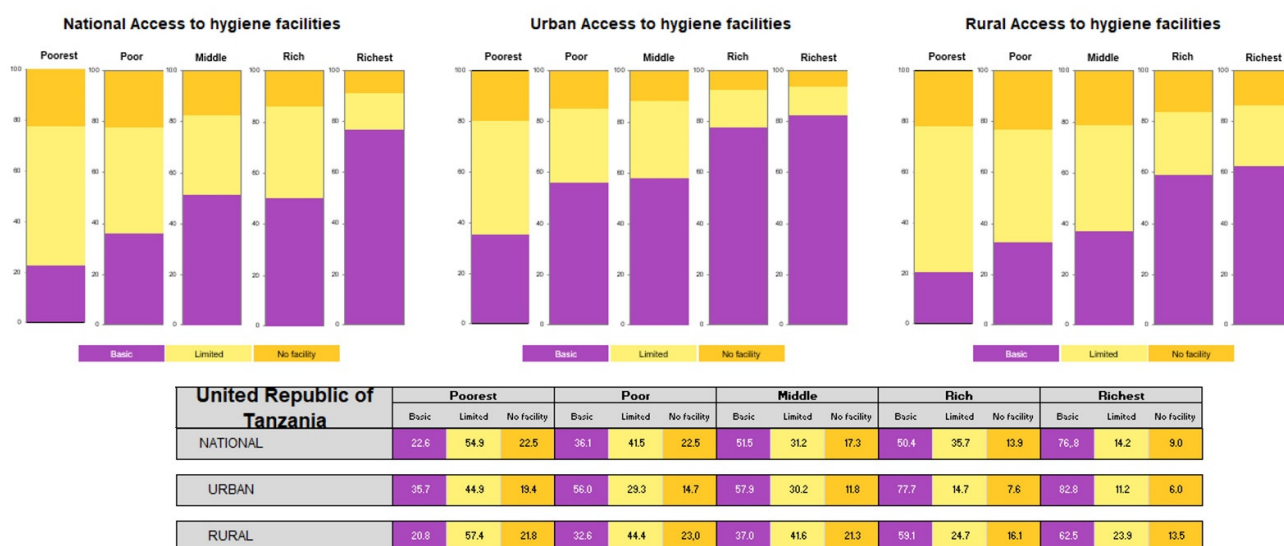
Limited: Use of improved facilities shared between two or more households.

Unimproved: Use of a pit latrine without a slab or platform, hanging latrines or bucket latrines.

Open defecation: Disposal of human faeces in fields, forests, bushes, open bodies of water and other open spaces or with solid waste.

Figure 1. Summary of the trends in the use of sanitation facilities by wealth quintiles (%), United Republic of Tanzania, 2015–2017. JMP metrics [19].

The adoption of hygiene measures does not differ much from that of sanitation. The handwashing systems implemented in the rural areas are simple and cheap to build (tippy tap system) but they are not widely adopted, especially among more economically depressed households (Figure 2). In 2016, 13.9% of the households of Dodoma lacked a handwashing facility and 73.6% had a facility without soap or water [19].



Basic: Facility with water and soap.

Limited: Facility lacking water or soap.

No facility: No handwashing facilities.

Figure 2. Summary of the trends in the use of hygiene facilities by wealth quintiles (%), United Republic of Tanzania, 2016. JMP metrics [19].

The main effort made at the national level in the recent years has been the National Sanitation Campaign (NSC). The NSC is coordinated and implemented by the Ministry of Health and Social Welfare (MoHSW) (now renamed the Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDGEC)). It is implemented within the Water Sector Development Programme (WSDP), the main national programme to make the National Water Sector Development Strategy 2007–2025 (NWDS) effective. The launch in 2011 of the NSC was a milestone for the sanitation sector in the country and the first step towards its improvement. It aims at mobilising 1.3 million households to improve their existing latrines or build new ones and improve sanitation facilities of 700 schools all over the country [21]. Phase I of the Campaign (2011–2015) aimed to improve rural households' adequate water and sanitation facilities using a combination of CLTS, social marketing and behaviour change communication, as well as by providing schools with appropriate WASH conditions. It was led by the Environmental Health Unit of the MoHSW [21]. The external evaluation of this initial phase highlighted many important weaknesses and poor achievements, especially regarding improved sanitation. A key point in Tanzania's rural sanitation programme was when the Minister announced at AfricaSan-4 in May 2015 that Tanzania had committed to becoming ODF by 2019.

The Usafi wa Mazingira Tanzania (UMATA) programme was designed by the Government of Tanzania to be an integral part of the NSC and specifically focuses on three low-coverage districts (Bahi, Chamwino and Kongwa) in the Dodoma Region. This strategy was defined by the Tanzanian Ministry of Health and funded by the Global Sanitation Fund (GSF). The overall objective of the programme was to promote "communities with increased access to and use of improved sanitation facilities, with changed sanitation and hygiene behaviours at scale" [11]. After the agreement adopted by the government in May 2015, the overall objective was focused on transforming Tanzania into an ODF country. The pilot was implemented in the district of Chamwino (Dodoma Region, Tanzania) because the area presents high OD rates [20]. In 2010, this district was among the twenty districts with higher under-five mortality rates in the country. In Chamwino, 94.2% of the population live in rural areas [23], and it is growing rapidly. The transfer of the Federal Government from Dar es Salaam to Dodoma altered the normal population growth in this area to rates higher than the annual 2.7% of the rest of the country [24].

This research aimed to assess progress in reducing inequalities in sanitation and hygiene in Dodoma analysing the UMATA results as representative of experience in rural Tanzania. As a result of this research, the hygiene and sanitation situation was characterised as well as the degree of adoption of different latrine types before (baseline) and after (follow-up) the implementation of the UMATA programme using the JMP metrics. The efficacy of the strategy implemented in Tanzania to reduce open defecation and promote sanitation was evaluated, identifying the critical economic factors affecting the adoption and sustainability of improved sanitation systems.

2. Materials and Methods

The UMATA programme was launched as a 5-year-long intervention (2012–2017). The study focused on 19 out of the 32 wards that form the Chamwino District in the Dodoma Region. The targeted area comprises 34 villages and their 241 subvillages (Figure 3). The selected wards are located in the central and southern parts of the district, while villages and subvillages were selected operationally, choosing those with no other projects in sanitation and with hygiene issues.

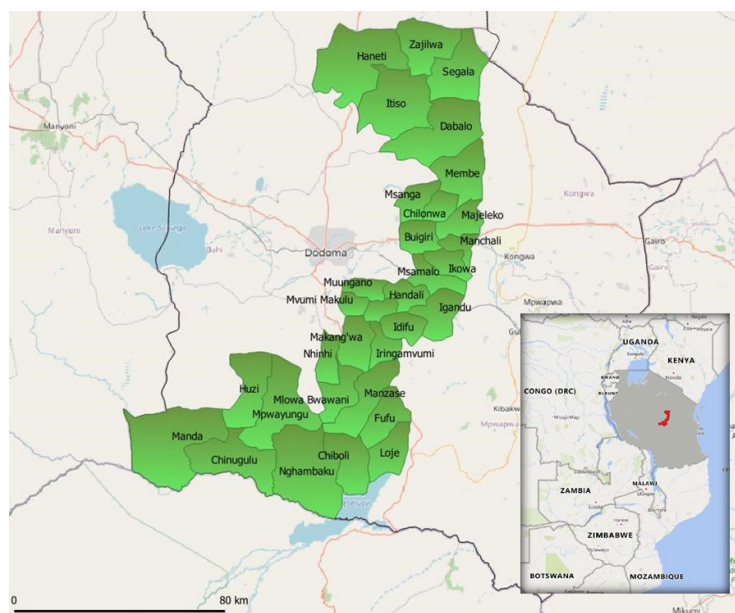


Figure 3. Chamwino District and wards in the Dodoma Region (Tanzania).

This research analyses and discusses the results obtained from the data collected in the field as part of the monitoring and evaluation components of the UMATA programme. These highly valuable data were obtained in the field through regular household data collection campaigns, defined according to the formats and templates used in the programme, consistent with national tools [11]. Our study compares information collected before and after execution of the hygiene and sanitation initiative. During these campaigns, more than 33% of the total rural population of the Chamwino District (approximately 102,000 people, according to census from 2012) were surveyed [23]. The data collectors were members of the communities with reading and writing skills previously trained by UMATA technicians selected at the subvillage level. The first field interview campaign (baseline) was carried out in 2015–2016, visiting a house after a house, up to a total of 21,077 households. In the second campaign (follow-up) conducted in September and October 2017, 22,281 households were visited. Information was collected on the sanitation situation, the types of the existing latrines and their location. The latrines were classified into seven types defined by the Tanzanian MoHSW, the handwashing facilities—into three types. The correspondence of each of these types identified in the survey with

the different levels of the sanitation or hygiene ladder (JMP metrics) is described in Tables 1 and 2, respectively. The last rung in the sanitation ladder (safely managed) was not defined by the time the UMATA programme was formulated, and the surveys were planned and designed. This rung implies a safely managed service and requires that excreta are safely disposed of in situ or toilets are connected to sewer systems safely. The interviewers were trained and had a document where each of the latrine types was described verbally and visually as in Table 1.

Table 1. Classification of each type of latrine and its level within the sanitation ladder.

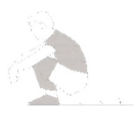


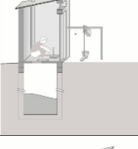
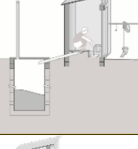




| Tanzanian MoHSW Classification (Identified in the Survey) | | | Sanitation Ladder (JMP Metrics) | |
|--|--|---|------------------------------------|--|
| Type | Definition | Scheme | Type | Definition |
| No latrine | No facilities |  | Open defecation | Disposal of human faeces in fields, forests, bushes, open bodies of water and other open spaces or with solid waste. |
| Type A | Traditional pit latrine (TPL) |  | Unimproved | Use of a pit latrine without a slab or platform, hanging latrines or bucket latrines. |
| Type B | Improved traditional pit latrine (ITPL) |  | Basic | Use of improved facilities which are not shared with other households. |
| Type C | Ventilated improved pit (VIP) |  | | |
| Type D | Flush |  | | |
| Type E | Ecosanitation (Eco-san) |  | | |
| Sharing improved | Improved facilities shared between two or more households. |  | Limited | Use of improved facilities shared between two or more households. |

Table 2. Classification of each type of the handwashing situation and its level within the hygiene ladder.

| Hygiene Ladder (JMP Metrics) (Identified in the Survey) | | |
|--|--|---|
| Type | Definition | Scheme |
| No facility | No handwashing facility on premises. | |
| Limited | Availability of a handwashing facility on premises without soap and water. |  |
| Basic | Availability of a handwashing facility on premises with soap and water. |  |

The baseline and follow-up data collection involved a household census with the basic data regarding sanitation and handwashing facilities. Furthermore, it monitored other specific fields like privacy of the latrine (roof and lockable door) and the availability of the slab and the lid.

Initially, UMATA proposed a combination of methodologies with equal weights: San-Mark, access to microfinance and CLTS. Due to the high incidence of OD in the targeted communities and low pace of progress in the first phases of implementation, the focus of implementation shifted to CLTS in the communities' analysed.

The data were analysed using the Statgraphics Centurion 19 software (Statistical Graphics Corp.) An analysis of variables was performed, including the main descriptive statistics (mean, median, mode, variance, standard deviation and the coefficient of variation) as well as box-and-whisker plots. The analysis of the differences between the medians was performed for the more frequent sanitation systems (A, B and none) before and after the intervention through a Kruskal–Wallis test, with a threshold significant level of $\alpha = 0.05$.

3. Results

The collection of information and subsequent analysis showed that before the Programme, 56.73% ($\pm 25.11\%$) of the population used an unimproved sanitation facility (type A latrines), and most other people, 40.02% ($\pm 25.10\%$), practiced OD (Figure 4). After carrying out the Programme, the situation presented a significant change. OD decreased to 9.70% ($\pm 15.80\%$), and most households built a basic latrine (type B), reaching 36.97% ($\pm 33.36\%$). Unimproved latrines (type A) currently represent 52.83% ($\pm 29.97\%$) of the latrines. This implies that there was an increase in constructed latrines (31%) in the households previously not having access to any kind of sanitation facilities in the community. The Kruskal–Wallis test of medians confirmed the significant changes in the adoption of basic latrines (type B; net increment) and the sharp reduction of open defecation (p -value < 0.05). If the excreta from improved sanitation facilities are not safely managed, then these facilities are classed as basic sanitation services (SDG 1.4). The collection of information showed that “unimproved” facilities in the study zone were latrines shared with other households (classified as limited service), or type E.

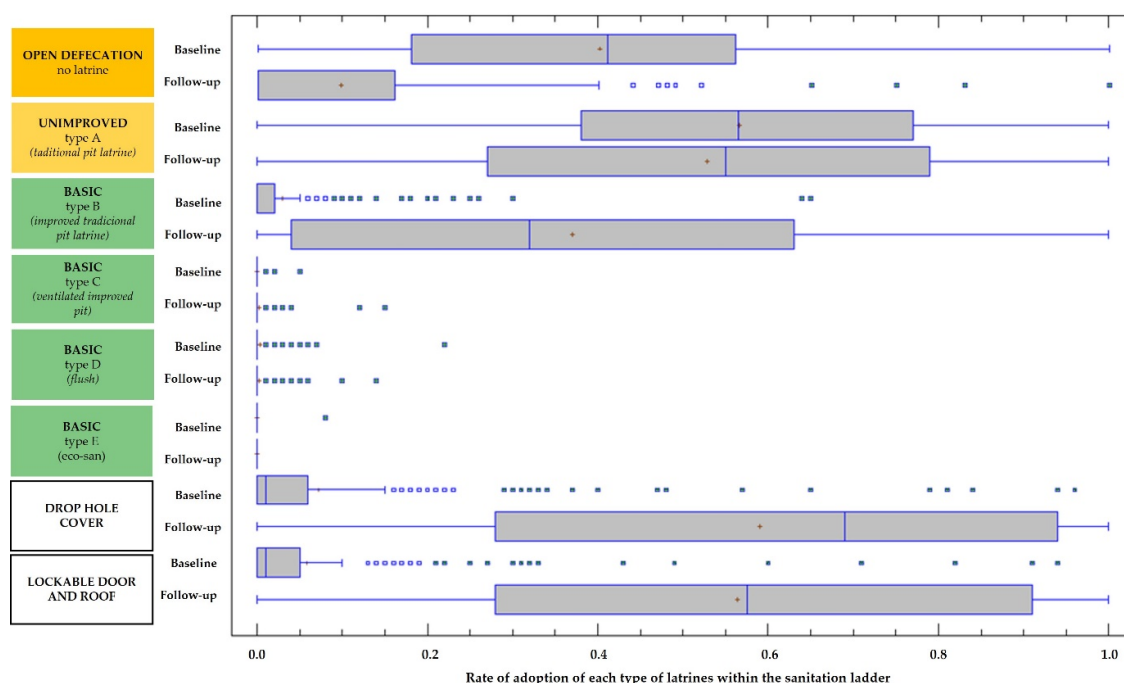


Figure 4. Box-and-whisker plot of the rate of adoption of each type of latrines within the sanitation ladder. Chamwino District before (baseline) and after (follow-up) the Programme. Data of the 241 subvillages interviewed.

The percentage that had a roof and a lockable door was analysed to evaluate the security and privacy of the latrines. Before 2016, only 5.83% ($\pm 14.35\%$) of the latrines had these facilities; after the implementation of the programme, the coverage of latrines with a cover and a lockable door increased to 56.16% ($\pm 34.82\%$).

Likewise, the use of lids in latrines was low before the intervention, as only 7.19% ($\pm 15.48\%$) of these latrines had a drop hole cover of the platform (Figure 4). It was observed that the percentage of assimilation of the technology was higher in some wards with 59.05% ($\pm 36.32\%$) than in others. The hygiene of the latrines was also very deficient. More than 96.7% of the homes visited before the Programme had dirt on the platform or on the floor; this tendency also subsided after the sensitisation process, although it would be important to check that this cleanness is not linked to the lack of use.

The hygiene and safety situation of the latrines was not optimal before 2016 (Figure 5). During the baseline survey, 8.50% ($\pm 21.70\%$) of the households had handwashing facilities. This percentage raised to 66.37% ($\pm 33.47\%$) after attending the Programme based on the CLTS and San-Mark approaches to facilitate community behaviour change. The collection of information and subsequent analysis showed that before the Programme, 26.91% ($\pm 23.97\%$), 28.97% ($\pm 28.99\%$) had utensil racks and rubbish pits in the latrine. After carrying out the Programme, the situation presented a significant change, and the numbers raised to 84.00% ($\pm 20.53\%$) and 83.36% ($\pm 22.92\%$), respectively.

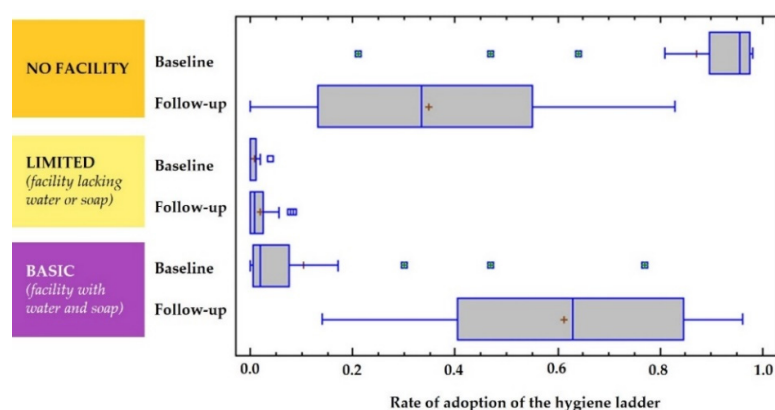
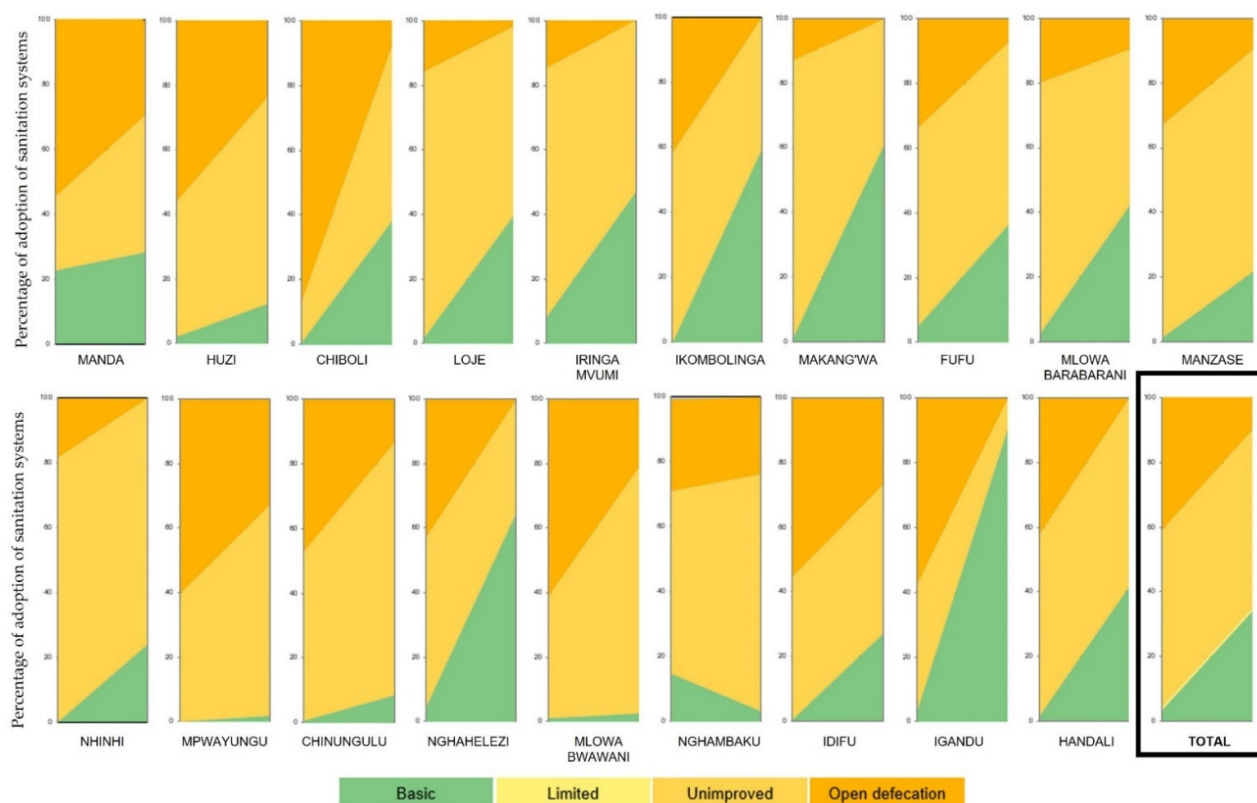


Figure 5. Box-and-whisker plot of the rate of adoption of the hygiene system in the Chamwino District before (baseline) and after (follow-up) the Programme. Data of the 241 subvillages interviewed.

The population was on a very low rung of the sanitation and hygiene ladders, and there was high variation between the villages (Figures 6 and 7). The ODF wards increased to seven at the end of the Programme (Figure 6), although no wards had 100% use of latrines with handwashing facilities (Figure 7).



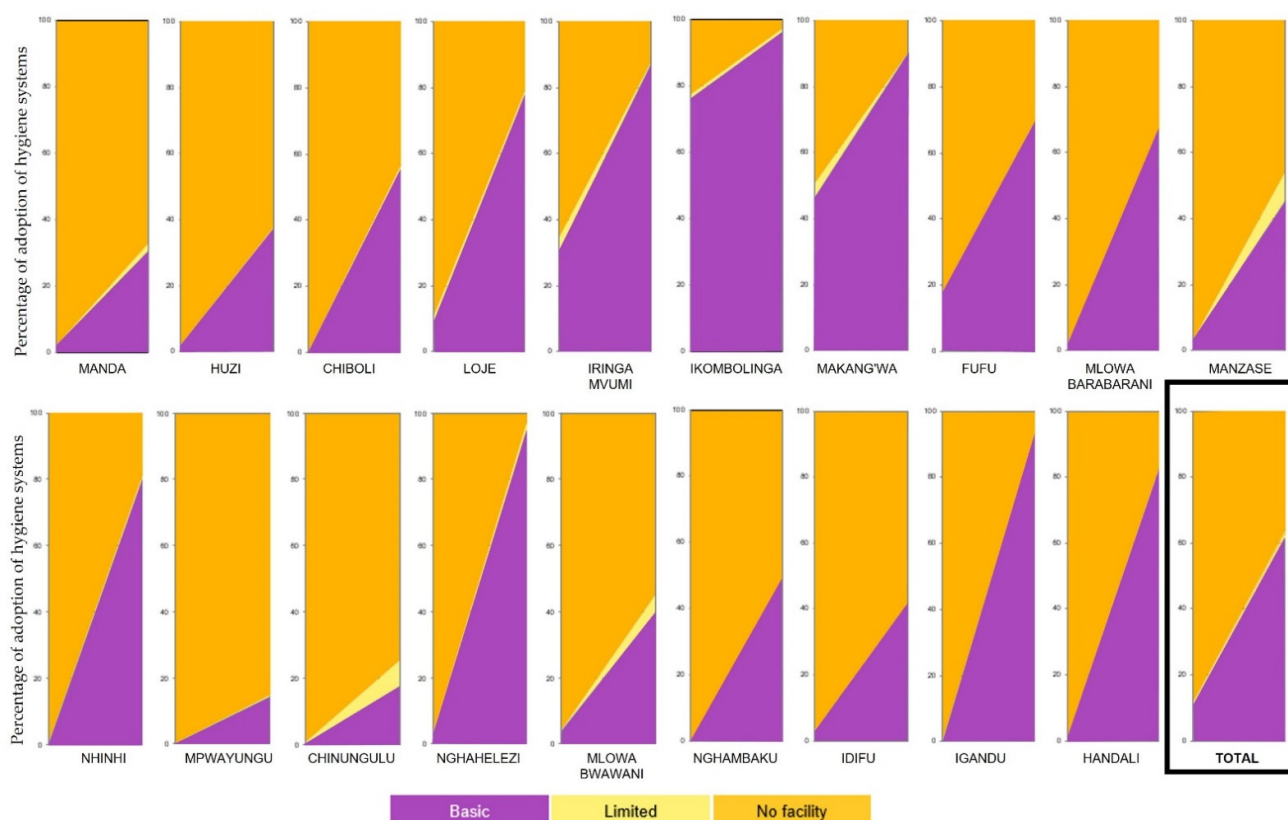
Basic: Use of improved facilities which are not shared with other households.

Limited: Use of improved facilities shared between two or more households.

Unimproved: Use of a pit latrine without a slab or a platform, hanging latrines or bucket latrines.

Open Defecation: Disposal of human faeces in fields, forests, bushes, open bodies of water and other open spaces or with solid waste.

Figure 6. Percentage of adoption of each type of latrines within the sanitation ladder in the 19 wards surveyed in the Chamwino District before (baseline) and after (follow-up) the Programme.



Basic: Facility with water and soap.

Limited: Facility lacking water or soap.

No facility: Without handwashing facilities.

Figure 7. Percentage of adoption of each type of the hygiene ladder in the 19 wards surveyed in the Chamwino District before (baseline) and after (follow-up) the Programme.

4. Discussion

Although Tanzania is the fifth largest recipient of international aid in the water, sanitation and hygiene sector [25], OD increased to 15% in rural areas [6]. These data are aligned with other analyses done by ONGAWA in other areas in the country [26]. OD prevalence presents a high geographic variability in Tanzania [20,27]. In 2016, OD in the Chamwino District was much higher than the national average, close to 40% (Figures 4 and 6). This value is higher than the figures provided by previous studies of rural Tanzania which already identified Chamwino among most vulnerable areas, placing OD there between 21% and 30%. The gap between both figures may be due to the rapid increase in the rural population in Dodoma from 2010 to 2016 (13.5%). The sudden population growth seems to facilitate the increase in the tendency to OD. Another reason may be that the previous studies included household surveys containing respondent bias regarding open defecation, which likely overestimated sanitation coverage [28] (Figure 2 versus Figure 6).

The Hygiene and Sanitation Programme contributed to reversing the previous sanitation situation in the targeted area. For the same period, the adoption of sanitation (Figure 6) and hygiene (Figure 7) was higher in the studied area than at the national level (Figures 1 and 2). In addition, it provided information at the ward level, because a single rate of sanitation coverage for the entire country may obscure potentially huge subnational variations [29]. This programme achieved a high rate of ODF, with 20 villages out of 34 and seven full wards attaining the ODF status. Although it failed to reach the 100% universal latrine coverage in the operation area (Figure 4), it obtained an impressive level of latrine adoption (30%). Undoubtedly, the existence of the national programme

managed and directly implemented by the government had a positive influence [30]. This increase in latrine coverage in the communities after the intervention is aligned with previous evaluation results in India, Indonesia and Tanzania [31–33]. However, the findings in Ethiopia, Indonesia and India reveal that household members with access to latrines continue to practice OD due to social norms, security, water scarcity and inconvenience during the use of latrines [31,32,34].

After the Programme, type B coverage increased significantly, reaching 36.97%. The previous studies conducted in the area [20] showed that basic latrines were not a priority among the rural population, limited access to credit being among the main causes of this low prioritisation [33,35]. Therefore, 93% of the households studied where OD was practiced planned to build a latrine, but only 18% believed that it should be an improved sanitation facility (11%—a latrine with a slab, 7%—ventilated improved pit latrine, VIP) [20]. In this case, in Chamwino, the trend seemed to be different, as the sharp increase in type B latrines shows.

The results are quite positive, considering the elements linked to basic sanitation. In 2016, more than 90% of the existing latrines were unimproved as they had pits without a slab or a platform and the hygiene system was not yet sufficiently implemented in the area. This percentage varied from ward to ward (Figure 6). Before 2016, only 5.83% of the latrines had a roof and a lockable door, which give users privacy (Figure 4). Although privacy was identified as one of the main reasons to build a latrine (57% of the households interviewed) [20], in the Chamwino households, the traditional means used for latrine privacy was normally a piece of cloth; that might be the reason why the coverage of latrines with lockable doors was very low initially. In the surveys conducted in the area, some users interviewed said that having a roof is unsafe because there is a belief that snakes take refuge in it. The door was considered an expensive item to be purchased in the market. It is observed that there are wards where the percentage of latrines with doors and roofs is higher. There is no relationship between the proximity to the city of Dodoma, the population density and the implementation of this type of technologies, so it is possible that this pattern is due to the footprint of previous sanitation programmes developed in those areas. The use of lids in latrines was low before the Hygiene and Sanitation Programme despite being a very cheap [36] and easy-to-construct item that reduces the odour and the potential transmission of diseases through flies and mosquitoes.

In 2016, the hygiene and safety situation of the latrines was not optimal (Figure 5). The data show that, although people were aware of their importance, the presence of devices to wash hands with soap and water remained low, standing below 10% (Figures 5 and 7) and putting Chamwino villages on the first rung of the hygiene ladder. The programme used the CLTS and San-Mark approaches to facilitate community behaviour change through triggering and traditional dancing to educate the communities on the importance of handwashing at every critical moment, such as after using toilet, after washing a child and so forth. Furthermore, the programme emphasised proper handling of domestic utensils and solid waste management. After the triggering process, practices of good hygiene behaviour improved at the household level. According to the SDG 6 indicator, improvements in handwashing can be measured by an increase in the availability of these facilities. In some communities, adoption is still low despite the fact that the cost of the tippy tap technology in the area is very cheap and waste materials are used [36]. The real level of adoption and use should also be deeply analysed, taking into account the scarce access to water in the area (16.16% on average in the targeted wards), and also the sustainability challenges of this technology identified by another study [37].

The analysis of the results of the adoption of hygiene and sanitation systems is fundamental due to the fact that the quality of latrines and handwashing facilities built and low water coverage are factors which put the sustainability of results at risk. Furthermore, the rapid increase in basic latrine construction under the Programme for the period of June–September 2017 was driven by the commitment and involvement of political leaders such as ward councillors and district officials after institution triggering [38]. This poses

an additional risk to sustainability as the increase in latrines might not be linked to real behaviour changes. Thus, sustainability should be proven over time as it has been noted for other similar experiences funded by the GSF. Regarding OD eradication, it is an important milestone towards the achievement of SDG 6, although not sufficient itself. Further, although the obtained results are important, there is no field information about the adoption of safely managed sanitation as the Programme started before this rung was defined. The latest published estimations at the national scale (July 2021) consider that safely managed systems comprised about 17–20% in rural Tanzania in 2015–2017, being only of the “disposed of in situ” type [19]. There is a wide range of unsanitary and environmentally unsafe conditions that arise when toilets are not connected to safe excreta disposal systems. It is necessary to begin to focus on this type of facilities in the rural area of Dodoma.

Beyond the quality and types of sanitation facilities, full achievement of SDG 6 from the HRTS perspective would require the consideration of relevant additional questions and factors to ensure the sustainability of the systems after interventions. There is relevant research on the assessment of the degree of sustainability of water, sanitation and hygiene systems in different countries and situations (Sweden [39], Argentina [40] and South Korea [41]). A sanitation sustainability index (SSI) was proposed to measure the main technical, environmental, economic and social dimensions of sanitation alternatives [41]. It is recommended to perform a similar analysis for the sanitation systems used and designed for countries like Tanzania to guide future policies and actions towards the total disappearance of OD and the continuous improvement of sanitation. Other relevant questions, such as non-discrimination under the “leaving no one behind” principle, should be monitored and guaranteed. According to the follow-up programme report, 30% of the households which still lack access to any kind of the sanitation facilities are owned by poor elderly people who cannot afford to construct latrines [38]. Likewise, real participation and engagement of all population groups, especially the most vulnerable, should be deeply analysed and considered. In this sense, some of the adaptations incorporated in the CLTS methodology which prioritised law enforcement and other pressure mechanisms towards the population should be properly reviewed, mainly regarding the pressure on vulnerable groups to build latrines as it has been highlighted in the evaluation of the GSF’s programmes [42].

5. Conclusions

This research assessed the impact of hygiene and sanitation programmes in the degree of achievement of the Sustainable Development Goals and human rights in Sub-Saharan Africa. The proposed methodology allows measuring the adoption of different hygiene and sanitation systems promoted through nationwide actions. It also provides a relevant baseline of the recent evolution of this subject in Tanzania and one of its rural districts for future studies.

The communities surveyed in 2016 in the Chamwino District were far from meeting target 6.2 of the 2030 SDGs, “equitable access to adequate sanitation and hygiene services for all and ending the OD”, before the implementation of the programme. Post-evaluation by UMATA confirmed its notable contribution to the reversal of this trend, especially in reducing OD to 9.70% and achieving several ODF villages.

According to the field data, latrine building peaked during the intervention process. These positive results are encouraging for supporting integrated hygiene and sanitation programmes in countries with generally low access to basic latrines. Nevertheless, the implemented monitoring system (2012–2017) was designed prior to the 2030 Agenda, lacking some aspects for tracking completely the achievement of the SDGs and HRTS today as the safely managed sanitation and sustainability dimensions of the new international commitments.

Beyond the monitoring and evaluation systems and tools, specific adaptations should be incorporated in the most frequent methodologies for the promotion of hygiene

and sanitation, such as CLTS, for ensuring that the “leaving no one behind” principle is applied.

6. Patents

U201930715 (04/06/2018) “Latrine slab and mould for its manufacturing”. Utility model.

Author Contributions: Conceptualization: B.G.-R., A.E.-Z., C.V.-P., E.J.C. and J.A.M.; methodology, B.G.-R., A.E.-Z., C.V.-P. and J.A.M.; software, B.G.-R.; validation, A.E.-Z. and C.V.-P.; formal analysis B.G.-R., C.V.-P. and E.J.C.; investigation, B.G.-R., A.E.-Z. and E.J.C.; resources, B.G.-R. and C.V.-P.; data curation, B.G.-R.; writing—original draft preparation, B.G.-R. and A.E.-Z.; writing—review and editing, B.G.-R. and C.V.-P.; visualization, A.E.-Z., C.V.-P.; E.J.C. and J.A.M.; supervision, A.E.-Z., C.V.-P. and J.A.M.; project administration, B.G.-R. and C.V.-P.; funding acquisition, B.G.-R., C.V.-P. and E.J.C. All authors have read and agreed to the published version of the manuscript.

Funding: The research has been conducted in the framework of the project “Sanitation demand creation and hygiene behaviour change in communities and institutions in Chamwino District”, part of the programme UMATA (Usafi wa Mazingira Tanzania), implemented by ONGAWA, Engineering by Human Development, as sub-grantee, funded by Global Sanitation Fund, coordinated by Ministry of Health of Tanzania and managed by Plan International as executing agency.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Acknowledgments: The authors gratefully acknowledge Plan International and ONGAWA, Engineering for Human Development, Executing Agency and sub-grantee, respectively, of UMATA (Usafi wa Mazingira Tanzania) project in Chamwino District for providing the monitoring and evaluation data used in this study. UPM team has been supported by the Direction of Cooperation and the Platform for Africa (Universidad Politécnica de Madrid). We also acknowledge Charlotte Rooney for her thorough English revision of the manuscript. The opinions expressed in the article are that of the authors and do not represent the perspectives of abovementioned organizations.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. UN General Assembly. The Human Right to Water and Sanitation: Resolution/Adopted by the General Assembly. A/RES/64/292. 2010. Available online: <https://www.refworld.org/docid/4cc926b02.html> (accessed on 20 November 2021).
2. UN Committee on Economic Social and Cultural Rights. The Right to Water (Arts. 11 and 12 of the International Covenant on Economic, Social and Cultural Rights). 2003. Available online: <https://www.refworld.org/pdfid/4538838d11.pdf> (accessed on 20 November 2021).
3. UN General Assembly. The Human Rights to Safe Drinking Water and Sanitation. A/RES/70/169. 2016. <https://undocs.org/pdf?symbol=es/A/RES/70/169> (accessed on 20 November 2021).
4. Rivero, M.; Fernández, C.; Quintero, C.; Pérez, P.; Guijarro, A. *Saneamiento un Derecho Humano*; Spain, 2017. Available online: <https://ongawa.org/publicaciones/saneamiento-un-derecho-humano/> (accessed on 15 September 2021).
5. Wateraid, Unilever, and Water Supply and Sanitation. We Can’t Wait: A Report on Sanitation and Hygiene for Women and Girls. 2012. Available online: https://washmatters.wateraid.org/sites/g/files/jkxoof256/files/we_cant_wait.pdf (accessed on 15 October 2021).
6. *Progress on Drinking Water, Sanitation and Hygiene: 2017 Update and SDG Baselines*; World Health Organization (WHO): Geneva, Switzerland; The United Nations Children’s Fund (UNICEF): Geneva, Switzerland, 2017.
7. Ziegelbauer, K.; Speich, B.; Mäusezahl, D.; Bos, R.; Keiser, J.; Utzinger, J. Effect of sanitation on soil-transmitted helminth infection: Systematic review and meta-analysis. *PLoS Med.* **2012**, *9*, e1001162. <https://doi.org/10.1371/journal.pmed.1001162>.
8. Waddington, H.; Snilstveit, B.; White, H.; Fewtrell, L. *Water, Sanitation and Hygiene Interventions to Combat Childhood Diarrhoea in Developing Countries*; International Initiative for Impact Evaluation: New Delhi, India, 2009; pp. 1–3. <https://doi.org/10.23846/SR0017>.
9. Fewtrell, L.F.; Kaufmann, R.B.; Kay, D.; Enanoria, W.; Haller, L.; Colford, J.M., Jr. Water, sanitation, and hygiene interventions to reduce diarrhoea in less developed countries: a systematic review and meta-analysis. *Lancet Infect. Dis.* **2005**, *5*, 42–52. [https://doi.org/10.1016/S1473-3099\(04\)01253-8](https://doi.org/10.1016/S1473-3099(04)01253-8).

10. Prüss-Üstün, A.; Bos, R.; Gore, F.; Bartram, J. *Safer Water, Better Health: Costs, Benefits and Sustainability of Interventions to Protect and Promote Health*; World Health Organization: Geneva, Switzerland, 2008. Available online: http://apps.who.int/iris/bitstream/10665/43840/1/9789241596435_eng.pdf (accessed on 29 September 2021).
11. MoHSW, Plan, AMCA, and CSR. *Baseline Survey Report, USAFI wa Mazingira Tanzania (UMATA) Programme Chamwino, Bahi and Kongwa Districts of Dodoma Region*; AMCA-Inter Consult Limited: Dar es Salaam, Tanzania; The CSR Group Limited South Africa: Lagos, Nigeria, 2014.
12. WHO. *Sustaining the Drive to Overcome the Global Impact of Neglected Tropical Diseases*; WHO: Geneva, Switzerland, 2013.
13. WHO. *Capacitación e Información Sobre PHAST*; WHO/EOS/98.3; WHO and SI: Geneva, Switzerland, 1998.
14. Lenton, R.; Wright, A. *Health, Dignity, and Development: What Will It Take?*; Abridged E: London, UK, 2005.
15. Kvarnström, E.; Mcconville, J.; Bracken, P.; Johansson, M.; Fogde, M. The sanitation ladder—A need for a revamp? *J. Water Sanit. Hyg. Dev.* **2011**, *1*, 3–13. <https://doi.org/10.2166/washdev.2011.014>.
16. Kar, K.; Chambers, R. *Handbook on Community-Led Total Sanitation*; IDS: London, UK, 2008; ISBN 978-0-9550479-5-4
17. Scheumann, R.; Kraume, M. Community led total sanitation (CLTS): Addressing the challenges of scale and sustainability in rural Africa. *Desalination* **2009**, *248*, 123–130. <https://doi.org/10.1016/j.desal.0000.00.000>.
18. The World Bank. World Development Indicators. Data Catalog. 2017. Available online: <https://data.worldbank.org/data-catalog/world-development-indicators> (accessed on 14 January 2018).
19. WHO and UNICEF. Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (JMP). Estimates of National, Regional and Global Progress on Drinking Water, Sanitation and Hygiene (WASH). 2020. Available online: <https://washdata.org/data/household#!/table?geo0=country> (accessed on 27 December 2021).
20. Sara, S.; Graham, J. Ending Open Defecation in Rural Tanzania : Which Factors Facilitate Latrine Adoption ? *Int. J. Environ. Res. Public Health* **2014**, *62*, 9854–9870. <https://doi.org/10.3390/ijerph110909854>.
21. Jiménez, A.; Mtango, F.F. The role of Districts in the implementation of Tanzania’s National Sanitation Campaign. Research Report for Sanitation and Hygiene Applied Research for Equity (Share). 2013. Available online: https://assets.publishing.service.gov.uk/media/57a089be40f0b64974000242/Districts_in_the_NSC_Report_Tanzania.pdf (accessed on 26 September 2021)
22. Sachs, J.; Schmidt-Traub, G.; Kroll, C.; Durand-Delacre, D.; Teksoz, K. Global Responsibilities. International spillovers in achieving the goals. *SDG Index Dashboards Rep.* **2017**, *2017*, 396. [https://doi.org/10.1016/S0140-6736\(09\)61513-0](https://doi.org/10.1016/S0140-6736(09)61513-0).
23. Nations United. City Population. 2016. Available online: <http://www.citypopulation.de/php/tanzania-central-admin.php> (accessed 10 March 2021).
24. Msacky, R. Need Assessment and Available Investment Opportunities in the health sector: A case of dodoma region, tanzania. *Bus. Educ. J.* **2017**, *1*, 1–7. Available online: <http://www.cbe.ac.tz/bej> (accessed on 27 December 2021).
25. WHO and UNICEF. Progress on Drinking Water and Sanitation. 2012. Available online: http://www.wssinfo.org/fileadmin/user_upload/resources/JMP-report-2012-en.pdf (accessed on 29 December 2021).
26. ONGAWA. *Sustainable Management of Chome Nature Reserve in Same District*; ONGAWA: Madrid, Spain, 2017.
27. Bertha, B.; Coville, A.; Martinez, S. *Promoting Handwashing and Sanitation: Evidence from a Large-Scale Randomized Trial in Rural Tanzania*; WPS7164; World Bank: Washington, DC, USA, 2015.
28. Herrera, V. Reconciling global aspirations and local realities: Challenges facing the Sustainable Development Goals for water and sanitation. *World Dev.* **2019**, *118*, 106–117. <https://doi.org/10.1016/j.worlddev.2019.02.009>.
29. Bartram, J.; Brocklehurst, C.; Fisher, M.B.; Luyendijk, R.; Hossain, R.; Wardlaw, T.; Gordon, B. Global monitoring of water supply and sanitation: History, methods and future challenges. *Int. J. Environ. Res. Public Health* **2014**, *11*, 8137–8165. <https://doi.org/10.3390/ijerph110808137>.
30. Jiménez, A.; Mtango, F.F.; Cairncross, S. What role for local government in sanitation promotion ? Lessons from Tanzania. *Water Policy* **2014**, *14*, 1104–1120. <https://doi.org/10.2166/wp.2014.203>.
31. Barnard, S.; Routray, P.; Majorin, F.; Peletz, R.; Boisson, S.; Sinha, A.; Clasen, T. Impact of Indian Total Sanitation Campaign on Latrine Coverage and Use: A Cross-Sectional Study in Orissa Three Years following Programme Implementation. *PLoS ONE* **2013**, *8*, e0071438. <https://doi.org/10.1371/journal.pone.0071438>.
32. Cameron, L.; Shah, M.; Olivia, S. *Impact Evaluation of a Large-Scale Rural Sanitation Project in Indonesia*; World Bank: Washington, DC, USA, 2013. <https://doi.org/10.1596/1813-9450-6360>.
33. Kamara, J.K.; Galukande, M.; Maeda, F.; Luboga, S.; Renzaho, A.M.N. Understanding the challenges of improving sanitation and hygiene outcomes in a community based intervention: A cross-sectional study in rural Tanzania. *Int. J. Environ. Res. Public Health* **2017**, *14*, 602. <https://doi.org/10.3390/ijerph14060602>.
34. Oljira, D.; Berkessa, T. Latrine use and Determinant Factors in Southwest Ethiopia. *J. Epidemiol. Public Heal. Rev.* **2016**, *1*, 1–5. <https://doi.org/10.16966/2471-8211.133>.
35. WSP. Market Research Assessment in Rural Tanzania for New Approaches to Stimulate and Scale up Sanitation Demand and Supply. 2009. Available online: http://www.wsp.org/sites/wsp.org/files/publications/TZ_TSSM_Research_Report.pdf (accessed on 07 September 2021).
36. Zazo, A.E.; Mweche, C.; Zapico, A.; Kiboko, S.; Mwambala, T.; Seleman, P.T. *Affordable Sanitation Products Choo Bora na Mazingira Safi (Kongwa District)*; GCSASD: Madrid, Spain, 2014; p. 31. Available online: https://issuu.com/ana_ezazo/docs/catalogue_english (accessed on 29 December 2021).

37. Briceño, B.; Coville, A.; Gertler, P.; Martinez, S. Are there synergies from combining hygiene and sanitation promotion campaigns: Evidence from a large-scale cluster-randomized trial in rural Tanzania. *PLoS ONE* **2017**, *12*, e0186228. <https://doi.org/10.1371/journal.pone.0186228>.
38. Barongo, E. *Effectiveness of Community-Based Sanitation and Hygiene Intervention at Household Level in Dodoma, Tanzania. Case of UMATA Program in Chamwino District*; University of Antwerp: Antwerpen, Belgium, 2018.
39. Lundin, M.; Molander, S.; Morrison, G.M. A set of indicators for the assessment of temporal variations in the sustainability of sanitary system. *Water Sci. Technol.* **1999**, *39*, 235–242. <https://doi.org/10.2166/wst.1999.0244>.
40. Iribarnegaray, M.A.; D'Andrea, M.L.G.; Rodriguez-Alvarez, M.S.; Hernández, M.E.; Brannstrom, C.; Seghezzo, L. From indicators to policies: Open sustainability assessment in the water and sanitation sector. *Sustainability* **2015**, *7*, 14537–14557. <https://doi.org/10.3390/su71114537>.
41. Hashemi, S. Sanitation sustainability index: A pilot approach to develop a community-based indicator for evaluating sustainability of sanitation systems. *Sustainability* **2020**, *12*, 6937. <https://doi.org/10.3390/SU12176937>.
42. House, A.S.; Ferron, S.; Cavill, S. *Scoping and Diagnosis of the Global Sanitation Fund's Approach to Equality and Non-Discrimination*; Water Supply and Sanitation Collaborative Council: Geneva, Switzerland, 2017; p. 137.