

Community Engagement and Dental Care: Early Insights From an Oman–Zanzibar Initiative

Abubaker Qutieshat, Nutayla Al Harthy, and Mohamed Al Ismaili

Abstract

Oman Dental College partnered with local health agencies in Zanzibar, Tanzania, for an international dental outreach project. This early-stage engagement aims to address Zanzibar's pressing dental health needs and to provide a transformative educational experience for student volunteers. Informed by the intertwined histories of Oman and Zanzibar, the project delivered preventive and curative dental services, emphasizing the need for sustained oral hygiene education. Initial impact measurements revealed the high prevalence of dental decay, highlighting a need for preventive measures. Volunteers reported educational gains and a deeper understanding of Oman–Zanzibar heritage. Challenges such as electricity, internet connectivity, and sterilization conditions were identified for future improvement. This project provides valuable lessons for community engagement, especially the importance of preparation, adaptability, and long-term community involvement for sustained impact. Future directions include training local health care workers and developing community-based oral hygiene programs.

Keywords: dental outreach, dental health, health promotion, preventive dentistry



Oral health is indispensable to overall health and well-being. However, it remains an overlooked domain, especially in low- to middle-income countries where limited resources, lack of awareness, and insufficient dental infrastructure widen the disparity in dental care access. International dental outreach camps, such as the one spearheaded by Oman Dental College (ODC) in Zanzibar, serve as transformative initiatives, bridging these gaps. These camps provide essential dental services to underserved communities and create a fertile learning ground for dental volunteers (Elkind, 2002; Eriksen et al., 2011).

Zanzibar's oral health situation is similar to that of Tanzania as a whole, with a low prevalence of dental care programs, limited availability of free dental care, and a lack of preventive programs (Petersen & Mzee, 1998). Recent World Health Organization (WHO) reports and additional assessments across African regions consistently highlight Tanzania's relatively low incidence

of dental caries. Surprisingly, residents in urban areas have a significantly lower risk of developing dental caries than their rural counterparts (Mbawalla et al., 2023). This situation represents a significant shift from 25 years ago, highlighting the current focus of dental care initiatives primarily in urban areas. This trend has inadvertently increased the gap in dental care access for rural areas, resulting in higher levels of untreated dental caries. In particular, the prevalence of dental caries in primary teeth remains alarmingly high (Petersen & Mzee, 1998). The vast majority of these cases are decayed teeth, which outnumber those that are filled or removed, highlighting a significant gap in available dental treatment.

Delving into the essence of this outreach, we find ourselves at the confluence of health care pragmatism and societal well-being, particularly in the context of dental health. This discourse is not merely about cataloging dental health issues and their prevalence among specific demographics; it is an exploration into how such documenta-

tion can serve as a cornerstone for proactive health care strategies. The underpinning here suggests a deep-seated recognition of oral health not just as an individual concern but as a communal attribute, reflecting broader societal health dynamics and disparities.

The foundation of this outreach initiative lies in recognizing that understanding the prevalence and characteristics of dental health issues among rural populations, such as those on the island of Unguja in Zanzibar, is essential for developing successful prevention and treatment strategies. This approach emphasizes a dedication to addressing and controlling health issues with the now-available resources, thus facilitating the development of more nuanced and efficient health interventions later on.

Such an initiative acknowledges that the landscape of health needs and interventions is ever-evolving, necessitating adaptive strategies informed by both past outcomes and current challenges. Therefore, the endeavor to document and analyze dental health issues becomes an exercise in understanding the dynamic relationship between health services and community needs, aiming to address current health challenges and anticipate and mitigate future ones.

Outline

In charting the course of this project, we embark on a journey that commences with a detailed exploration of the critical importance of oral health to holistic well-being, particularly within the context of Zanzibar's unique challenges and the broader landscape of Tanzania's dental health disparities. Next, we delve into the conceptualization, execution, and outcomes of the Oman Dental College's outreach initiative, framing it within the larger discourse on health care pragmatism, societal well-being, and the dynamic interplay of global health interventions. This narrative unfolds through an examination of the methodologies employed, the critical analysis of clinical and volunteer feedback data, and reflections on the tangible impacts observed. Closing in a discussion that reflects on the findings and contemplates the future trajectory of such initiatives, this article endeavors to provide a comprehensive account that bridges the gap between individual health issues and communal well-being. Through this account, we aim to elucidate the complexities and triumphs of addressing oral health

disparities in low-resource settings, offering insights into the potential for sustainable health interventions and the indelible impact of hands-on educational experiences in shaping the next generation of dental professionals.

Setting the Context

In this continuum of exploration and action, ODC emerges as the Sultanate of Oman's premier and sole dental institution, committed to exemplary education, community service, and active engagement. Zanzibar, with its deep historical ties to Oman shaped by centuries of trade and shared cultural narratives, offers a compelling setting for this initiative. As mentioned earlier, the region, like many low- to middle-income nations, contends with the challenge of limited dental care access. Recognizing this unmet need, a partnership between ODC and the regional health authorities was envisioned, rooted in their intrinsic connection and shared history. Their goal was twofold: to address Zanzibar's dental care void while offering ODC students a tangible real-world experience. This collaboration aims to mitigate the dental health disparities in Zanzibar and enriches the educational fabric of ODC, resonating with the comprehensive view that oral health plays a pivotal role in the holistic well-being of a community. This article aims to document and share the insights and outcomes of this unique outreach, setting a precedent for future health interventions and educational collaborations.

Project Overview

This dental outreach initiative, conducted over a period of 2 weeks, targeted communities on the island of Unguja in Zanzibar. While aiming to provide immediate dental care, it also aspired to establish a foundation for sustained oral health practices and offer dental students invaluable hands-on experience in diverse field conditions. Experienced faculty members from ODC, with expertise spanning dental caries assessment, dental trauma, and oral surgery, played a pivotal role in guiding the project's execution. The initiative was designed with core functions that revolved around comprehensive dental health assessments, immediate interventions, and patient-centric oral health education. This hands-on approach reflects ODC's commitment to marrying practical dental health care delivery with deep educational underpinnings.

Building on this foundation, ODC underscores a crucial distinction between “voluntourism,” a blend of volunteering and tourism, and responsible global health engagement. This academic differentiation, first prominently discussed in the scientific literature by Seymour et al. (2013), illustrates the college’s dedication to making genuine global health contributions. By integrating mentored experiences and public health knowledge, ODC prepares its students for global health experiential learning that extends beyond theoretical knowledge to include real-life volunteering and meaningful contributions to global health. This strategic educational philosophy ensures that the college’s outreach initiatives focus on providing immediate care while fostering a long-term impact on global health, guided by responsible engagement and a deep commitment to community well-being.

The College benchmarks itself against the world’s leading dental schools in both curricular and extracurricular activities. A testament to its excellence, a news piece published on September 26, 2014, in the prestigious *British Dental Journal* featured Professor Finbarr Allen, former dean and professor of restorative dentistry at Cork University Dental School and Hospital. He commended the quality and standard of education at Oman Dental College, stating it matches those of UK dental schools, an impressive feat for a relatively young institution. “I am sure that the College and its graduates will go from strength to strength,” he remarked, highlighting the institution’s potential for continued excellence and influence in the field of dental education (“Oman Dental College Goes From Strength to Strength,” 2014).

This study unfolds a dual-focused analysis. First, it evaluates the clinical impact of the dental outreach camp on Zanzibar’s community. Second, it delves into the experiences of the participating volunteers, elucidating the rewards, challenges, and lessons from their journey. By amalgamating these dimensions, this study paves the way for a holistic understanding of international dental outreach camps’ potential, challenges, and avenues for refinement.

Materials and Methods

Ethical approval for this outreach activity was duly obtained from ODC and the Ministry of Health in Zanzibar, ensuring

that the project adhered to the necessary ethical guidelines and protocols. This outreach activity was also conducted in strict adherence to the principles of the Declaration of Helsinki and other relevant ethical guidelines for research involving human subjects, ensuring respect for the rights and welfare of the individuals and communities involved. All participants in the outreach camp, including minors who provided assent alongside parental consent, offered informed consent, with confidentiality and privacy upheld throughout the process.

This study implemented a dual-focused methodology, encompassing the collection and analysis of clinical data, and providing the required treatment to patients at the international dental outreach camp, alongside capturing feedback data from the volunteers who participated.

The outreach initiative examined and treated 112 pupils from Bwejuu Charity School, aged 3 to 17 years. Eligibility for participation was extended to all pupils present at the dental camps and willing to engage in the process. To guarantee the consistency and precision of diagnostic and treatment approaches, the team underwent a thorough calibration process prior to the outreach. Dental examinations were conducted using portable dental chairs with integrated lighting, facilitated by comprehensive dental examination kits containing all essential instruments. To uphold the highest hygiene and patient safety standards, all instruments were sterilized through autoclaving prior to use on each patient. Moreover, rigorous cross-infection control measures were in place, with team members wearing new disposable gloves, gowns, and masks for each patient examination, ensuring meticulous prevention of cross-contamination.

The clinical data was collected from each patient who attended the outreach camp. These records included patient demographics (age, gender), tooth numbers, procedure codes, and treatment provided. Special attention was paid to instances of tooth decay (caries) as a key indicator of oral health in the population served by the outreach camp. This data was compiled and analyzed to provide a quantitative understanding of the dental health situation in the community and the extent of the services provided during the dental outreach camp. Statistical analysis was performed using GraphPad Prism, Version 9.

Similarly, feedback was diligently collected from a total of 19 volunteers, comprising students, new graduates, and faculty (Appendix). This process was guided by a validated model for local empowerment and sustainable development for dental outreach programs, as described by Arefi et al. (2020). This qualitative data serves as a window into participants' experiences, insights, and recommendations, offering a blueprint for future outreach endeavors.

The feedback data was obtained via a comprehensive two-part questionnaire given to the volunteers after the dental outreach camp. The first part of the questionnaire consisted of 30 Likert scale questions with responses ranging from *strongly agree* (5) to *strongly disagree* (1), covering areas such as preparation, organization, support, facilities, and satisfaction with the outreach camp. The second part of the survey had eight open-ended questions aimed at gathering more nuanced insights into the volunteers' experiences, challenges, highlights, and suggestions for improvements.

Both the clinical and feedback data were an-

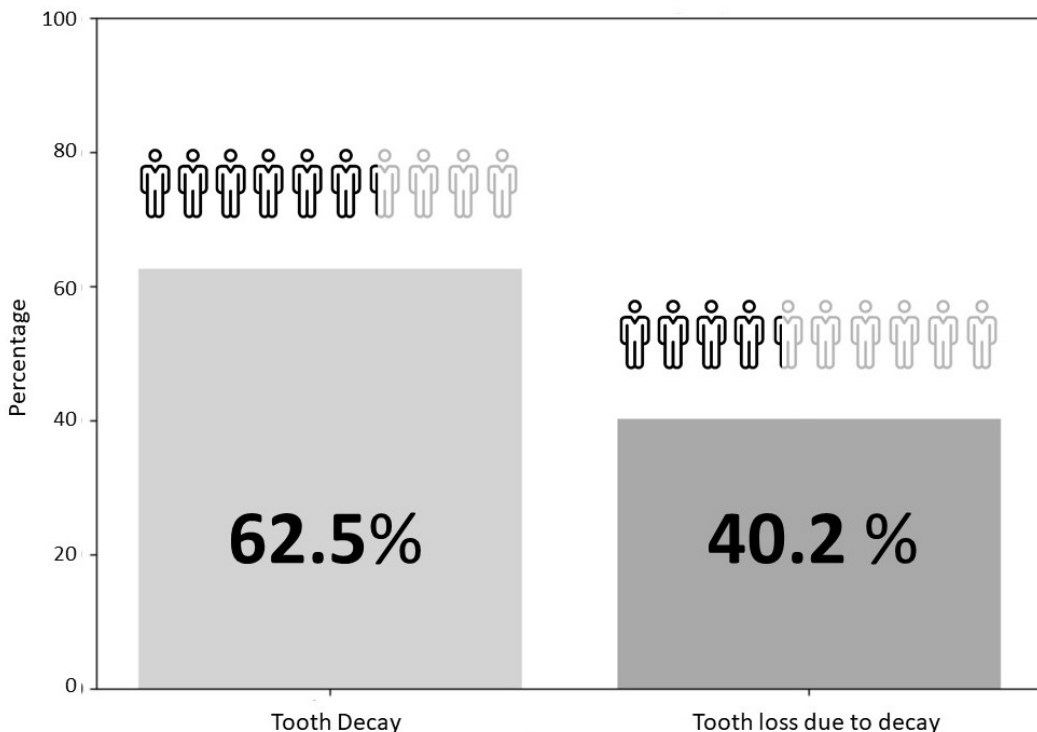
alyzed separately to produce a quantitative and qualitative understanding of the dental outreach camp. The clinical data provided an objective measure of the dental health in the community and the services provided, and the feedback data gave a subjective view of the volunteers' experiences, highlighting areas of success and opportunities for improvement. Together, these data sources provided a comprehensive view of the dental outreach camp's impact on the community and the volunteers.

Results

Patient Data Analysis

In analyzing the clinical data of 112 pupils, a slight male predominance was observed, with a male-to-female patient ratio of 1.2:1. Dental health assessment revealed that 62.5% of the pupils showed signs of tooth decay, either current or past, underscoring the prevalence of this condition within the community. Furthermore, 40.2% had undergone tooth extraction due to decay, highlighting the prevalence of advanced dental issues (Figure 1).

Figure 1. Bar Chart Illustrating the Prevalence of Tooth Decay and Tooth Extractions Due to Decay Among Pupils in Zanzibar



Regarding dental trauma, a significant majority, 90.2%, exhibited no signs of trauma. Enamel fractures were the second most common finding, affecting 8.0%, with only a single case (0.9%) of treated injury recorded. Soft tissue lesion examination revealed that the most frequent locations were the inner cheek (10.7%) and the tongue (5.4%).

When assessing the urgency of dental interventions among the pupils, it was found that over half (50.9%) required immediate treatment. Examples of such prompt treatments included the filling of cavities to address tooth decay, emergency root canal treatments to save severely infected teeth, and the extraction of teeth that were beyond salvageable condition due to severe decay or trauma. Additionally, some cases necessitated immediate therapeutic interventions to manage acute infections or abscesses, aimed at relieving pain and preventing further spread of infection.

A third of the patients (33.9%) needed preventive or routine treatments, which could involve professional dental cleanings to remove plaque and tartar buildup, the application of fluoride treatments to strengthen tooth enamel and prevent decay, and the placement of dental sealants on the molars of younger patients to protect against cavities. Only a smaller segment of the population (15.2%) was assessed as not requiring urgent dental interventions. For these patients, regular monitoring and follow-up visits were recommended to maintain their oral health status and prevent the development of future dental issues.

A chi-square test was performed to explore the potential association between gender and dental issues, revealing no statistically significant difference ($p > 0.05$), indicating that dental health problems were uniformly distributed across genders.

Volunteers Data Analysis

The majority of the participants in the study were students, comprising 42.11% of the sample, and graduates, comprising 36.84%. Clinical supervisors comprised a smaller part of the participant pool at 15.79%, with administrators comprising the remaining 5.26%. In terms of the duration of the camp, over half of the participants thought that the camp should last for longer than 2 weeks, with most of the responses indicating 3–4 weeks at least (52.63%), although

a significant number felt that 2 weeks was adequate (42.11%).

The majority of participants found the online platform utilized for recording patient information to be user-friendly, with 73.68% affirming this view. However, within this group, 68.42% believed that a paper-based system might have been more reliable, given the region's suboptimal internet connectivity.

When asked about their outreach experience at the camp, most participants rated their outreach involvement as either very good (42.11%) or excellent (31.58%). Those who were neutral about their outreach experience (26.31%, with none expressing dissatisfaction) predominantly cited reasons related to not being able to fully meet the needs or achieve the main objectives of the camp, particularly given the camp's short time frame. A significant portion of the participants (63.16%) had not previously participated in an international dental outreach camp, whereas a smaller group (31.58%) had previous experience in similar endeavors elsewhere. Regarding the adequacy of the number of pupils treated, opinions were divided: 52.63% felt the number was sufficient, but 47.37% believed more pupils should have been seen, given the evident need for intervention and/or treatment.

A substantial majority of participants (over 75%) expressed satisfaction or high satisfaction with various facets of the experience, such as cross-infection measures, dental equipment and materials, pretravel arrangements, accommodations, meal quality, and touristic excursions. However, nearly half of the participants expressed significant dissatisfaction with the internet connectivity and the reliability of the electrical supply.

In terms of cultural exchange, a significant 78.95% of participants deemed it very meaningful. The depth of local community interaction was well-received, with 89.47% of participants reporting satisfaction or high satisfaction. Likewise, the perceived impact of these interactions was positively rated, with 84.21% expressing satisfaction or high satisfaction. Despite these positive responses, some participants highlighted a desire for more immersive cultural exchanges, suggesting that deeper engagement with the local community could further enrich the outreach experience.

Regarding language barriers, 36.84% of participants identified lack of familiarity with Kiswahili as a hindrance, yet all within this group were eager to learn the language for future camps to provide better service and foster more meaningful cultural connections.

An overwhelming 94.74% of participants showed interest in future involvement in similar events. Additionally, the camp met or exceeded the expectations of 84.21% of participants.

Discussion

Clinical Data

The review of clinical data from the dental outreach camp provides critical insights into the oral health challenges within the served community, particularly highlighting the pervasive issue of tooth decay. This observation aligns with the broader global trend, particularly in low- and middle-income countries, where access to preventive dental care is limited, and dental diseases, especially tooth decay, are prevalent (Kandelman et al., 2012; Northridge et al., 2020; Watt et al., 2019; Yee & Sheiham, 2002).

The number of teeth lost due to decay is another significant finding. Tooth loss due to decay could suggest a lack of early dental intervention in this community, leading to advanced dental issues that necessitate the surgical removal of affected teeth. The ratio of fillings to tooth removals could serve as an indicator of the state of oral health in the community, reflecting both the prevalence of dental disease and the availability (or lack thereof) of early, preventive dental care.

Encouragingly, the considerable proportion of preventive treatments performed, such as fluoride applications, fissure sealants, and scaling, underscores the camp's pivotal role in not merely addressing existing dental issues but also in laying the groundwork for preventing future occurrences. Such a preventive strategy is particularly vital in settings where routine dental care access is sporadic or non-existent, emphasizing the camp's immediate and prophylactic impact on community oral health (Breda et al., 2019).

The critical need highlighted by the extensive treatments provided during the camp underscores the imperative for sustained, accessible dental care services within the community. The substantial short-term impact of the camp, in terms of both re-

medial treatment and preventive care, illustrates the potential of outreach initiatives in bridging the immediate care gap. However, it also accentuates the need for systemic changes to establish regular, locally accessible dental services that can offer continuous care and effectively prevent dental diseases (Peres et al., 2019).

Although the outreach camp has demonstrated its capacity to provide immediate care and preventive interventions, it is imperative to recognize these efforts as complementary to the broader necessity for accessible, ongoing dental health care infrastructure. The outreach's contributions toward alleviating immediate dental health issues and setting a preventive care precedent are commendable. Still, they highlight the critical need for establishing permanent and accessible dental health care solutions that can address the root causes of dental health disparities and ensure the sustainability of oral health improvements in underserved communities.

Feedback Data

In this international dental outreach camp, the overarching goal was to provide dental services to underserved communities while providing an enriching and rewarding experience for volunteers. The study analyzed the qualitative responses of the volunteers to evaluate their experiences, assess the impact on their learning and professional development, and identify potential areas of improvement for future outreach camps.

Volunteers' Experience

The overwhelming sentiment among volunteers was that the outreach camp offered a deeply rewarding and meaningful experience. Volunteers were particularly touched by their interactions with the local population, especially children, fostering a sense of camaraderie akin to a family within the team. The opportunity to either assist with or directly perform dental procedures in an outreach context was immensely valued, highlighting the camp's dual benefits: providing critical services to communities in need while offering invaluable hands-on learning experiences for volunteers. This symbiosis of service and education underscores the significant, multifaceted impact of outreach camps, aligning with insights from Bingham et al. (2022) on the enrichment of professional and personal growth through service-learning.

A segment of participants who expressed neutrality toward their outreach experience, without venturing into dissatisfaction, navigated a philosophical introspection about the ephemeral nature of such outreach efforts. Despite recognizing the commendable efforts of the team, they contemplated the camp's limited capacity for delving into the nuanced, entrenched issues of dental health within the community. This acknowledgment of the disparity between the provision of immediate care and the need for systemic transformations to secure enduring improvements in oral health serves as a poignant meditation on the constraints of short-term interventions in remedying long-standing health inequities.

Interestingly, the decision of one participant to abstain from future camps stemmed from an overwhelmingly positive shift, catalyzing a reorientation toward pursuing more sustained solutions in global health. This unique outcome, rather than reflecting a shortfall of the camp, highlights its profound capacity to inspire and reshape career trajectories, emphasizing the program's transformative potential on participants' professional paths and philosophical outlooks.

Challenges encountered during the camp primarily revolved around environmental and logistical hurdles, including electricity and Wi-Fi connectivity issues and sterilization processes. Specific to the dental aspect, volunteers faced a learning curve with portable autoclaves, leading to some operational confusion. Additional logistical concerns involved scheduling discrepancies and health or safety incidents among team members, alongside some noted friction in team dynamics. Proactively addressing these operational and interpersonal challenges could substantially enhance the efficacy and enjoyment of future camps, ensuring a smoother, more cohesive outreach experience for all involved.

Learning Outcomes and Changes in Views

Volunteers reported significant learning outcomes, varying from practical skills, including sterilization in an outreach setup, to interpersonal skills like communication with patients and teamwork. The outreach camp appears to have broadened volunteers' understanding of global health inequalities, particularly around basic dental care needs, and deepened their appreciation for teamwork and community service.

Most volunteers expressed a keen interest in participating again in a similar camp in Zanzibar, and should there be a need for change, they are open to considering other locations, such as remote areas in Nepal, Bhutan, and Kenya. This readiness to engage in outreach camps across various locations underscores the volunteers' dedication to delivering dental care to underserved communities worldwide.

Suggestions for Improvement

Volunteers proposed a number of improvements for future outreach camps, such as providing more dental chairs, organizing the clinical settings into zones, seeking ethical approval for surveys in advance, and ensuring thorough checks of equipment before transport. More nuanced suggestions included offering a language course in Kiswahili before the outreach camp and creating videos and printed materials for oral hygiene education. Several responses also emphasized the importance of improved team organization and communication, underscoring the importance of a well-structured, cooperative environment for the success of such outreach camps.

The open-ended responses provide invaluable insights into the personal and professional experiences of the volunteers and offer clear direction for improvement of future outreach camps. Through addressing these logistical and environmental challenges, the impact of these outreach camps can be maximized for both the volunteers and the communities they intend to serve. By establishing a strong foundation of equal partnership between the volunteers and the local community, we set the stage for sustained, long-term engagement. This approach enables community dialogue to identify key issues and allows us to deploy volunteer expertise in crafting innovative, efficient solutions. This collaborative model maximizes the impact of the outreach camps, benefiting both the communities served and the volunteers involved (Garber et al., 2010).

The feedback data and the clinical data together provide a comprehensive understanding of the dental outreach camp's impacts. The high levels of satisfaction and positive experiences reported by the volunteers suggest that the outreach camp was successful in its execution and organization. However, the challenges and suggestions highlighted by the volunteers, such as

the need for improved communication and planning, present opportunities for improving future outreach camps. These improvements could potentially lead to more efficient delivery of services, enhancing the overall impact of the outreach camp.

Reflections

In reflecting on the feedback from volunteers, a tapestry of insights on sustainability, impact, and personal growth emerges, woven with their firsthand experiences. One volunteer reflected on the complexity and fulfillment of their role, stating, “The mix of cultural immersion and the hands-on provision of essential dental care was both challenging and rewarding.” This comment underscores the enriching experience of blending service with deep cultural engagement, highlighting the dual nature of challenges and rewards in such missions.

Another volunteer captured the essence of the outreach’s immediate impact, remarking, “Despite the limited resources, the gratitude of the locals and seeing the tangible difference we made were the primary rewards of this trip.” Another added, “Seeing the happiness in the eyes of children was the best experience.” These reflections emphasize the profound joy and satisfaction derived from making a visible difference in the lives of those served, even in the face of resource constraints.

Addressing the practical aspects of cross-cultural interaction, a volunteer suggested, “I believe that some basic language training before the outreach camp would help us communicate more effectively.” This insight points to the importance of overcoming language barriers to enhance the effectiveness of volunteer work and deepen connections with the community.

Furthermore, acknowledging the value of well-rounded experiences, a participant shared, “The touristic excursions were refreshing breaks that allowed us to explore and appreciate the local culture.” This observation highlights how integrating leisure and cultural exploration can enrich the volunteer experience, providing balance and deeper cultural understanding.

These reflections from volunteers illuminate the multifaceted impact of the outreach program, from the immediate joy of serving communities and witnessing tangible results to the broader implications of cultural exchange and sustainable health improve-

ments. Each quote, with its unique perspective, contributes to a fuller understanding of the outreach’s significance, in terms not only of dental care provided but also of fostering personal growth, cultural appreciation, and a vision for sustained community health advancements.

Next Steps and Utilization of Early Findings

The future trajectory of this dental outreach project warrants a detailed exploration to ensure its sustainability and the effective utilization of its early findings. The immediate success and insights gained from the camp provide a foundational understanding of the community’s dental health needs, laying the groundwork for strategic planning and enhancement of future outreach efforts.

The project’s future involves a strategic approach to leveraging the initial findings to refine and expand the outreach model. The high incidence of tooth decay and the necessity for extractions highlighted by the camp’s data underscore the critical need for early intervention and education. Consequently, future iterations of the project will prioritize educational programs on oral hygiene and preventive care, aiming to reduce the prevalence of tooth decay and other preventable dental conditions. Additionally, the feedback on the limitations encountered, such as the barrier posed by language and the need for deeper cultural exchanges, suggests a pivot toward more community-centric approaches, incorporating local health workers and translating materials into Kiswahili to enhance communication and engagement.

Sustainability of the Project

For the project to be sustainable, it must transcend episodic interventions to foster a long-term impact on the community’s oral health landscape. Doing so entails establishing partnerships with local health care providers and organizations to ensure continuity of care and the integration of oral health services into existing health care frameworks. The project’s sustainability will also rely on continuous funding and resource allocation, which could be achieved through a combination of government support, private donations, and international aid. Furthermore, training local health care workers in dental care and preventive practices will empower the community to take

ownership of its oral health, making the project's impacts more enduring.

Future Improvements Based on Early Findings

The learnings from this outreach are instrumental in shaping its future direction. The project team plans to implement a more robust data collection and analysis framework to continuously monitor and evaluate the effectiveness of its interventions. This iterative process will enable real-time adjustments and enhancements, ensuring that the outreach remains responsive to the community's evolving needs. Moreover, exploring innovative solutions to overcome infrastructural challenges, such as unreliable internet and electricity, will be crucial. Such solutions might include the deployment of mobile dental units equipped with solar power and offline digital record-keeping systems to ensure uninterrupted care delivery and data management.

The project's future hinges on its ability to evolve based on the lessons learned from its initial phase, with a clear emphasis on sustainability, community engagement, and the integration of preventive measures. By addressing these aspects, the project aims to mitigate current oral health challenges and lay a solid foundation for a healthier future for the community it serves.

In reflecting upon the limitations of our study, it is important to mention that the outreach was conducted exclusively in schools, which, while providing a substantial sample, may not entirely represent the broader pediatric population of Zanzibar, including those children not enrolled in or not regularly attending school. Additionally, our study is limited by its cross-sectional design, which captures the dental health status of participants at a single point in

time, making it challenging to establish causality or track changes in individual health over time. The reliance on self-reported data for some aspects of the study could also introduce bias. Furthermore, the scope of our dental assessments, although comprehensive, did not include some specialized tests that might offer deeper insights into certain conditions. We also acknowledge that the cultural and logistical constraints inherent in conducting outreach in a low-resource setting may have influenced both our approach to data collection and the range of interventions we could offer. Finally, although we endeavored to maintain high standards of diagnostic consistency, variations in clinical judgment among the diverse team of dental professionals and students could contribute to diagnostic variability.

Conclusions

At the core of the international dental outreach in Zanzibar, was the ambition to mitigate immediate dental health challenges while also offering a profound transformative experience for volunteers. Set against the rich historical backdrop of Oman and Zanzibar, this venture stood out for its depth of collaboration.

The project's commitment to evolving based on initial learnings, with an emphasis on sustainability, community engagement, and preventive care, sets a trajectory toward not just addressing immediate dental health issues but establishing a foundation for long-term community health betterment. This project exemplifies the potential of international outreach to forge sustainable solutions, reflecting a comprehensive approach that transcends temporary interventions.



Funding Statement

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Declaration of Interest

The authors declare no conflicts of interest related to this study. No member of the research team has any financial, consultant, institutional, or other relationships that might lead to bias or a conflict of interest.

Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

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All three authors contributed to the conception and design, analysis, and interpretation of data, drafting and revising the article, and gave final approval for the version to be submitted.

References

- Arefi, P., Cardoso, E., & Azarpazhooh, A. (2020). Reexamining dental outreach programs: A model for local empowerment and sustainable development. *The Journal of the American Dental Association*, 151(5), 340–348. <https://doi.org/10.1016/j.adaj.2020.01.023>
- Bingham, E., Burrows, A., Deery, C., Lambert, D. W., Stokes, C., & Jowett, A. (2022). Twenty years of outreach teaching in Sheffield. *British Dental Journal*, 233(6), 449. <https://doi.org/10.1038/s41415-022-5052-6>
- Breda, J., Jewell, J., & Keller, A. (2019). The importance of the World Health Organization sugar guidelines for dental health and obesity prevention. *Caries Research*, 53(2), 149–152. <https://doi.org/10.1159/000491556>
- Elkind, A. (2002). Outreach teaching: Is this the future for dental education? *British Dental Journal*, 193(2), 111–112. <https://doi.org/10.1038/sj.bdj.4801497>
- Eriksen, H. M., Bergdahl, M., Byrkjeflot, L. I., Crossner, C. G., Widström, E., & Tillberg, A. (2011). Evaluation of a dental outreach teaching programme. *European Journal of Dental Education*, 15(1), 3–7. <https://doi.org/10.1111/j.1600-0579.2010.00636.x>
- Garber, M., Creech, B., Epps, W. D., Bishop, M., & Chapman, S. (2010). The Archway Partnership: A higher education outreach platform for community engagement. *Journal of Higher Education Outreach and Engagement*, 14(3), 69–81. <https://openjournals.libs.uga.edu/jheoe/article/view/684>
- Kandelman, D., Arpin, S., Baez, R. J., Baehni, P. C., & Petersen, P. E. (2012). Oral health care systems in developing and developed countries. *Periodontology 2000*, 60(1), 98–109. <https://doi.org/10.1111/j.1600-0757.2011.00427.x>
- Mbawalla, H. S., Nyamuryekung'e, K. K., Mtaya–Mlangwa, M., & Masalu, J. R. (2023). Dental caries pattern amongst Tanzanian children: National oral health survey. *International Dental Journal*, 73(5), 731–737. <https://doi.org/10.1016/j.identj.2023.03.008>
- Northridge, M. E., Kumar, A., & Kaur, R. (2020). Disparities in access to oral health care. *Annual Review of Public Health*, 41, 513–535. <https://doi.org/10.1146/annurev-publhealth-040119-094318>
- Oman Dental College goes from strength to strength. (2014). *British Dental Journal*, 217, 264. <https://doi.org/10.1038/sj.bdj.2014.825>
- Peres, M. A., Macpherson, L. M., Weyant, R. J., Daly, B., Venturelli, R., Mathur, M. R., Listl, S., Celeste, R. K., Guarnizo–Herreño, C. C., Kearns, C., Benzian, H., Allison, P., & Watt, R. G. (2019). Oral diseases: A global public health challenge. *The Lancet*, 394(10194), 249–260. [https://doi.org/10.1016/S0140-6736\(19\)31146-8](https://doi.org/10.1016/S0140-6736(19)31146-8)
- Petersen, P. E., & Mzee, M. O. (1998). Oral health profile of schoolchildren, mothers and schoolteachers in Zanzibar. *Community Dental Health*, 15(4), 256–262. <https://pubmed.ncbi.nlm.nih.gov/9973727/>
- Seymour, B., Benzian, H., & Kalenderian, E. (2013). Voluntourism and global health: Preparing dental students for responsible engagement in international programs. *Journal of Dental Education*, 77(10), 1252–1257. <https://doi.org/10.1002/j.0022-0337.2013.77.10.tb05599.x>
- Watt, R. G., Daly, B., Allison, P., Macpherson, L. M., Venturelli, R., Listl, S., Weyant, R. J., Mathur, M. R., Guarnizo–Herreño, C. C., Celeste, R. K., Peres, M. A., Kearns, C., & Benzian, H. (2019). Ending the neglect of global oral health: Time for radical action. *The Lancet*, 394(10194), 261–272. [https://doi.org/10.1016/S0140-6736\(19\)31133-X](https://doi.org/10.1016/S0140-6736(19)31133-X)
- Yee, R., & Sheiham, A. (2002). The burden of restorative dental treatment for children in Third World countries. *International Dental Journal*, 52(1), 1–9. <https://doi.org/10.1111/j.1875-595X.2002.tb00589.x>

Appendix. Volunteers' Experience Questionnaire

Demographic Information

- Role (Student, Graduate, Clinical Supervisor)
- Previous participation in international dental outreach camps

Camp Duration

- Satisfaction with the camp's duration
- Preferred duration for future camps

Technology and Record Keeping

- User-friendliness of the online platform for patient information
- Preference for record-keeping method

Outreach Experience Rating

- Overall rating of outreach involvement
- Reasons for neutral or negative experiences, if any

Impact and Adequacy

- Perceived adequacy of the number of pupils treated
- Satisfaction with the scope and impact of dental services provided

Facilities and Logistics

- Satisfaction with cross-infection measures, dental equipment, and materials
- Satisfaction with pre-travel arrangements, accommodations, meal quality, and touristic excursions
- Challenges faced regarding internet connectivity and electrical supply

Cultural Exchange and Community Interaction

- Perception of cultural exchange meaningfulness
- Satisfaction with depth and impact of local community interaction

Language and Communication

- Impact of language barriers on service delivery
- Interest in language learning for future outreach activities

Future Participation and Expectations

- Interest in participating in future outreach events
- Whether the camp met or exceeded expectations

Suggestions for Improvement

- Suggestions for logistical improvements
- Recommendations for enhancing cultural exchanges and team communication

Each section would have a mix of multiple-choice questions, Likert scale ratings, and open-ended questions.