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# Portable Dental Chairs in Supporting Dental Health Services in the Field Reviewed from the Aspect of Examination Quality

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**ABSTRACT**

Background: The government and health institutions are trying to improve access to dental services through field activities, but are hampered by facilities, especially dental chairs. Portable dental chairs are considered effective because they increase patient comfort, support ergonomic working positions for operators, and maintain examination quality. This study analyzes the effectiveness of their use through evaluation of examination quality aspects, with data obtained from surveys, observations, and questionnaires on dental and oral therapists in field services. Methods: This study used a *mixed method* (descriptive and analytical) with a *Research and Development (R&D) design* aimed at developing and testing product effectiveness. The study participants were 30 dental therapists from all community health centers in Banjarbaru City, South Kalimantan, with a data collection duration of one month. Results: The results of the effectiveness test of the use of the Portable Dental Chair model in dental health services in the field reviewed from the aspect of examination quality obtained a value of 0.000 ($p<0.05$). Conclusion: The portable dental chair model effectively supports the quality of examinations in dental health services in the field.

## INTRODUCTION

Oral and dental health is an integral part of general health and inseparable from people's quality of life. The World Health Organization (WHO) emphasizes that oral health plays a vital role in basic life functions, such as eating, speaking, and social interaction. In Indonesia, the prevalence of dental and oral problems remains quite high. The 2018 *Basic Health Research* (Riskesdas) showed that 57.6% of the Indonesian population had dental and oral problems, but only around 10.2% received dental care. This reflects a gap between the need for services and the availability of dental health facilities in the community. (Ministry of Health of the Republic of Indonesia, 2018) (WHO, 2022)

One effort undertaken by the government and health institutions is to provide dental health services in the field, for example through community service programs, *mobile dental services* , and promotional and preventive services in schools and remote villages. These activities aim to improve access to services, especially for communities with limited transportation or clinical facilities. However, the implementation of field services still faces challenges, particularly limited supporting facilities, such as dental chairs. (Makansi *et al.* , 2021)

Conventional dental chairs play a crucial role in supporting the quality of examinations by supporting ergonomic patient positioning and facilitating healthcare professionals' procedures. (Laswandi and Mularsih (deceased), 2021) However, their large size, heavy weight, and the need for electrical installations and dedicated space make conventional dental chairs difficult to implement in field care. Therefore, the innovation of portable dental chairs emerged as an alternative solution. Portable dental chairs are lightweight, easy to move, and can be used in various field care locations. (Sutomo, A., Pratiwi, R., & Haryanti, 2023)

The use of portable dental chairs is believed to improve the effectiveness of dental services in the field. For patients, these chairs provide comfort during examinations, even when performed outdoors. For

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operators, portable dental chairs facilitate ergonomic working positions, thus maintaining the quality of examinations. Several studies support this.

Research by Malekafzali et al. (2014) in *the Journal of Dentistry (Tehran)* found that portable dental units are effective in community dental health programs, as they can improve accessibility and help healthcare workers serve patients in hard-to-reach areas. However, the study also highlighted technical challenges, such as operator difficulty examining upper teeth due to limited chair adjustment. (Ilmianti *et al.* , 2022) (Malekafzali, 2014)

Another study by Pradhan et al. (2014) in *the Annals of Medical and Health Sciences Research* emphasized that portable dental units could be a solution to meet the dental health needs of rural communities in developing countries. Despite limitations in material durability and additional features, the use of portable dental chairs is considered capable of maintaining the quality of basic examinations in the field. (Siqueira, AA, Albuquerque, ACG, & Oliveira, 2016) (Pradhan, 2014b)

In Indonesia, research by Kurniawan et al. (2022) in *the Asian Journal of Dental and Health Sciences* developed a portable dental chair model based on operator comfort. The results showed that the portable chair can improve the work efficiency of dental healthcare workers, although challenges remain regarding the stability of the device in certain field conditions. (Kurniawan, 2022)

Based on this study, it is clear that portable dental chairs are an innovation with significant potential to support dental health services in the field, particularly in terms of examination quality. However, further research is needed to assess the effectiveness of portable dental chairs in maintaining examination quality standards, both in terms of patient comfort and operator efficiency, before they can be recommended as a standard tool in mobile dental health services. (Akmal, DZ, Heri, H., & Seswandi, 2022)

Quality dental care is determined not only by the skills of the medical staff, but also by the supporting examination equipment, one of which is the dental chair. Dental chairs function to position the patient in an ergonomic position, making it easier for the operator to perform examinations and treatments. However, conventional dental chairs have limited mobility due to their weight, bulkiness, and the need for electrical installation and a dedicated space (Pradhan et al., 2014).

As a solution, a lightweight, portable dental chair was developed that can be used in field service locations such as schools, remote villages, or community service activities. Research by Malekafzali et al. (2014) showed that portable dental chairs effectively increase the accessibility of dental services in areas with limited facilities, although technical challenges remain, such as chair stability during prolonged use. This innovation also has a positive impact on patient comfort and operator efficiency, allowing examination quality to be maintained even when performed outside the clinic (Kurniawan, 2022) . Thus, health service theory emphasizes that successful field service delivery depends not only on medical personnel but also on appropriate technology and equipment support.

Although portable dental chairs offer convenience in field dental services, several issues remain to be examined. First, the quality of dental examinations in the field is often suboptimal because the patient and operator positions do not always meet ergonomic standards, potentially reducing the effectiveness of the procedure. Second, patient comfort is often a challenge, especially in services that take place outdoors in less than ideal environmental conditions. Third, although portable dental chair innovations have begun to be developed, empirical assessments of their effectiveness in maintaining examination quality are still limited. This raises questions about whether portable dental chairs are truly capable of supporting field dental health services in terms of examination quality. (Pradhan, 2014a) (Malekafzali, 2014)

To address these issues, this study attempts to analyze the effectiveness of portable dental chairs in supporting dental health services in the field. The approach used is to evaluate patient comfort, operator ergonomics, and the quality of dental examinations using standardized assessment instruments. Data will be obtained through surveys, direct observations, and questionnaires with patients and medical personnel using portable dental chairs in field service activities. The results of this study are expected to provide scientific evidence regarding the advantages and limitations of portable dental chairs, thus providing a basis for developing more effective designs that are tailored to field needs.

## METHOD

In this study, the type of research used in this study is *a mixed method.* that is combination from study descriptive and analytic. Design study This use *Research and Development* (R&D). Study *Research and Development* aim For create product new or develop and improving existing ones, and testing their effectiveness. (Sugiyono, 2017) Participants were 30 dental therapists from all community health centers in Banjarbaru City, South Kalimantan Province. The activity was carried out in one month in July 2025.

The questionnaire was printed and distributed directly to dental therapists and summarized using a table with an assessment using a Likert scale. The questionnaire was created by the researcher with the objectives of this study in mind. The main focus of this study is the effectiveness of the Portable Dental Chair in Supporting Dental Health Services in the Field in terms of the Aspect of Examination Quality. The questionnaire covers the Aspect of Examination Quality which contains questions about operator comfort, ergonomic support, ease of access to tools, and the strength of the materials of the portable dental chair innovation. Data collected from respondents through the completed questionnaire is kept confidential and anonymous.

## RESULTS

This study is a study of the manufacture of portable dental chairs by testing the tool using an expert validation questionnaire. Expert validation was conducted to obtain data used as a basis for testing the feasibility of using *a portable dental chair* . Expert validation was carried out by four experts: a dentist, a dental therapist a psychologist, and an electromedical expert (ATEM). Expert validation was conducted to obtain data used as a basis for testing the feasibility of using a *portable dental chair model*.



Figure 1. Dental Chair Portable

The results of the feasibility test by experts can be seen in the following table:

**Table 1.** Expert Validation Test Results on the Use of the Portable Dental Chair Model

| No | Respondents | *Score | Average Criteria |
|---|---|---|---|
| 1 | Expert 1 | 95% | **Very Eligible Criteria** |
| 2 | Expert 2 | 77.5% | |
| 3 | Expert 3 | 80% | |
| 4 | Expert 4 | 87.5% | |
| Average | | 85% | |

The table above shows that the assessment results using the Likert scale show an average score of 85% with the criteria of Very Suitable, so that the *portable dental chair model* can be tested for product testing.

**Table 2.** Results of the Interclass Correlation Coefficient Test of Expert Validation on the Use of the Portable Dental Chair Model

| Test | Average | Category | *p-value* |
|---|---|---|---|
| Interclass Correlation Coefficient | 0.904 | Tall | 0.001 |

The table above shows that the results of the tool feasibility test from the expert validator averaged 0.904, which means the high category with a *p-value* of 0.001, indicating that *the Portable Dental Chair* is very suitable for supporting dental health service activities.

The study involved 30 dental therapists working in all community health centers in Banjarbaru City. The following results were obtained:

**Table 3.** Test of Tool Usage on Inspection Quality Aspects

| Variables | | Statistics | | |
|---|---|---|---|---|
| | | **Before** | **After** | ***P* -velue*** |
| **Quality Inspection** | | | | |
| a. | Mean±SD | 6.5±1.776 | 13.9±1.668 | 0.00 |
| b. | Min-Max | 4-12 | 12-16 | |

The table shows that there is a significant difference between the quality of examinations before and after the implementation of the Portable Dental Chair, as evidenced by a significance value of <0.05.

## DISCUSSION

In field dental care, examination quality is crucial for accurate diagnosis and effective treatment planning. Therefore, this portable dental chair supports optimal examination quality. Features such as the chair's tilt adjustment allow dentists to access the patient's teeth and mouth easily and efficiently. (Sadeghzade, G, et.al, 2021) Padded cushions and proper head and neck support also help ensure patient comfort during the examination, allowing them to remain calm and cooperative. Furthermore, the portable chair's portability allows for flexibility in chair placement in different examination rooms during field visits, which is essential for providing comprehensive care. By supporting high examination quality, this portable dental chair not only improves the efficiency of examination procedures but also ensures that dentists can provide accurate diagnoses and appropriate treatment plans, which in turn improves patient dental health outcomes. According to research by Rajshekar et al. (2019), using a portable dental chair with adequate diagnostic equipment can assist operators in developing treatment plans tailored to patient needs. (Rajshekar, V., Neeta, KV, & Pushpanjali, 2019) (Hallak *et al.* , 2023)

The quality of a dental examination is greatly influenced by the patient's position and the operator's work ergonomics. According to Sunaryo (2016) in his book, Dental Health Service Management, service quality is measured not only by the skills of medical personnel but also by the availability of facilities that support patient comfort and smooth procedures. Conventional dental chairs are designed to position the patient in an optimal supine position, allowing the operator to have a wide view of the oral cavity. However, in field care, the use of portable dental chairs is an alternative that allows examinations to be performed even without complete clinical facilities. (Sunaryo, 2019) (Suwarmiyati and Abi, 2020)

A study by Malekafzali et al. (2014) reported that the use of portable dental chairs can improve the accessibility of dental services in remote communities. However, in terms of examination quality, there are challenges such as limitations in chair positioning, which can affect the operator's perspective, especially when examining maxillary teeth. A similar point was emphasized by Pradhan et al. (2014) who stated that although portable dental chairs can maintain the continuity of dental examinations in the field, the quality of the procedure is greatly influenced by the chair design, material stability, and the suitability of the equipment to ergonomic standards. (Malekafzali, 2014) (Pradhan, 2014b)

Patient comfort is also an important indicator of examination quality. According to Greenstein (2007) in *Dental Ergonomics: Theory and Practice*, patient comfort contributes to the success of a procedure, as a relaxed patient will be more cooperative during the examination. Patients generally report good comfort with portable dental chairs, even though these chairs have simpler cushioning and backrests than conventional dental chairs. (Kurniawan, 2022)

From the operator's perspective, research by Kurniawan et al. (2022) shows that portable dental chairs can improve healthcare workers' work efficiency by facilitating relatively ergonomic working positions, even in the field. This impacts the quality of examinations, maintaining them. However, the study also found limitations such as chair stability on uneven surfaces, which can reduce examination quality, especially for procedures requiring high precision. (Kurniawan, 2022) (Roby and Morse, 2022)

## CONCLUSION

This study concluded that the use of portable dental chairs has proven effective in improving the quality of dental health examinations in the field. These chairs provide an examination position that meets ergonomic standards, improves patient comfort, and makes it easier for operators to maintain an ideal working posture. This allows for more optimal dental examinations, even in limited locations or far from permanent healthcare facilities.

Furthermore, the quality of dental examinations performed with a portable dental chair is relatively comparable to that of a conventional dental chair in terms of visibility, patient position stability, and basic procedural accuracy. This answers the research question: portable dental chairs are not only a practical solution for field services but also a tool capable of maintaining the quality of dental health services. However, challenges still encountered include limited material durability, stability during long-term use, and the need for ergonomics training for operators to truly optimize the benefits of using these chairs.

Thus, this study confirms that portable dental chairs have strategic value in improving access and quality of dental services in the field, especially in communities that have not yet been reached by formal health services.

## CONFESS

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