

## DIGITAL INSTRUMENT FOR INFANT AND TODDLER MORTALITY REVIEW USING USER-CENTERED DESIGN METHOD

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### Abstrak

Angka Kematian Bayi dan Angka Kematian Balita masih cukup tinggi di Indonesia. Data Dinkes Sumsel menunjukkan jumlah kasus kematian bayi dan Balita yang cukup tinggi di Kabupaten Banyuasin dan Musi Banyuasin, yakni 68 kasus dan 51 kasus pada tahun 2017. Melalui Program Kerja Sama (PKS) Direktorat Kesehatan Keluarga (Ditkesga) Kemenkes RI dan Fakultas Kesehatan Masyarakat Universitas Sriwijaya (FKM Unsri), ditemukan bahwa permasalahan terkait hal ini dipicu oleh belum adanya instrumen dalam bentuk digital untuk melakukan ulasan (review) terkait masalah kematian bayi dan Balita di Faskes yang diharap dapat membantu pencatatan dan pelaporan sehingga proses ulasan dapat berjalan lebih efektif dan efisien. Penelitian ini menggunakan metode User-Centered Design (UCD) karena menekankan dan mengoptimalkan prototipe aplikasi sesuai dengan kebutuhan dan keinginan pengguna akhir atau end-user. Tahapan pada metode UCD terdiri dari memahami konteks penggunaan (*understand context of use*), menentukan kebutuhan pengguna (*specify user requirements*), solusi desain (*design solutions*), dan mengevaluasi terhadap kebutuhan (*evaluate against requirements*). Berdasarkan penelitian yang telah dilakukan, didapat hasil rerata usability score adalah 94, yang berarti prototipe aplikasi ini telah dibuat sesuai dengan kebutuhan dan keinginan pengguna akhir atau end user, serta prototipe aplikasi ini juga sudah layak untuk diimplementasikan.

**Kata Kunci:** Bayi, Balita, Kematian, Ulasan, UCD

### Abstract

The Infant Mortality and Toddler Mortality rates are still relatively high in Indonesia. Data from the South Sumatra Health Office shows a relatively high number of infant and toddler mortality cases in Banyuasin and Musi Banyuasin Regency, with about 68 and 51 cases in 2017. Through the Program Kerja Sama (PKS) of the family health directorate of the health ministry of the Republic of Indonesia and the Public Health Faculty of Sriwijaya University. Find problems related to the absence of instruments in digital form, which are useful for conducting studies on infant and under-five mortality problems in health facilities, which were expected to assist in recording and reporting the review process run more effectively and efficiently. This research uses the User-Centered Design (UCD) method because it optimizes the application prototype according to the needs and desires of the end-user, which in this case is the health worker in the Health Facilities in Banyuasin and Musi Banyuasin Regency. The UCD method phases include understanding the use context, specifying the user requirements, designing the solutions, and evaluating against requirements. The results of the study were that the average usability score was 94, meaning that this application's prototype has been made according to the needs and desires of end-users. Also, the prototype of this application is feasible to implement.

**Keywords:** Infants, Toddlers, Death, Reviews, UCD

### INTRODUCTION

The Infant Mortality Rate in Musi Banyuasin Regency, South Sumatra Province, was 49 cases in 2017, 51 cases in 2018, 45 cases in 2019, and 58

cases in 2019 (Dinkes Muba, 2020). The Musi Banyuasin District Health Office also explained that the Toddler Mortality Rate in this district was 0 cases in 2017, 0 cases in 2018, 0 cases in 2019, and 2 cases for 2020. In addition, the Infant Mortality



Rate in Banyuasin Regency, Sumatra Province South, was 5 cases in 2018, 7 cases in 2019, and 14 cases in 2020 (Dinkes Banyuasin, 2020). The Banyuasin District Health Office also reported that the Toddler Mortality Rate in this district was 2 cases in 2018, 0 cases in 2019, and 2 cases in 2020. These figures show that infant and toddler mortality cases in Banyuasin and Musi Banyuasin districts fluctuate and cannot be used as a definite measure.

Through the Program, Kerja Sama (PKS) of the Directorate of Family Health of the Ministry of Health of the Republic of Indonesia and the Faculty of Public Health of Sriwijaya University, Banyuasin, and Musi Banyuasin districts were chosen to be special locations related to infant and toddler mortality reviews. The selection of these two districts as special locations is due to the high number of infant and toddler mortality cases compared to other districts/cities in South Sumatra Province. Dinkes Sumsel (2018) quoted that Banyuasin Regency was in rank two, and Musi Banyuasin Regency was in rank five in 2017. The instrument for reviewing infant and toddler mortality in Health Facilities was successfully formulated in this program. The points contained are the Identity of Infants/Toddlers, Mothers, and Fathers, Infant/Toddler Intrinsic Factors, Infant/Toddler Death Information, Medical Causes of Death, Non-Medical Causes of Death, and Quality of Health Service Facilities. However, the instrument is still conventional, and the information from this form is less effective and efficient in reviewing infant and toddler mortality in the Health Facility.

Based on the results of the Focus Group Discussion that the researcher conducted together with representatives of Health Workers from the two districts, there were: (1) There is no digital instrument form to review the problem of infant and under-five mortality in health facilities, (2) The infant and toddler mortality review digital instrument form is expected to assist in recording and reporting. So the health workers can know the identity, intrinsic factors, death information, causes of infant and toddler death, and the quality of the health facility, and (3) The use of digital instruments form is more effective and efficient than manual instruments, the data can be stored properly, and the possibility of data being lost is slight.

Based on the problems above, the absence of digital instruments form is quite interesting for further research. It makes the researcher interested in researching digitizing the instrument through the design of a prototype application for reviewing infant and toddler mortality instruments in health facilities. The design of this application prototype will implement the usability principle proposed by

Jakob Nielsen. According to Jakob Nielsen (in Romaully Tambunan & Ginting, 2021), determining the usability of a system can be done through several aspects, such as learnability, efficiency, memorability, errors, and satisfaction. It is because the application of the User Interface and User Experience design on each system can affect the implementation and functionality of the system according to user needs (Rusanty et al., 2019). In addition, with the design of this application prototype, it is hoped that it can become a recommendation in the development of the application later and could make it easier for Health Workers to review infant mortality under five in Health Facilities.

Moreover, it is hoped that the Infant Mortality and Toddler Mortality rates in Banyuasin and Musi Banyuasin Regencies can decrease and suit the Ministry of Health's Target for 2020-2024. The review results can be used for analysis to make decisions and policies in terms of emphasis: the Infant Mortality Rate and Toddler Mortality Rate in the two districts.

The solution that the researcher will provide in this research is the design of a prototype application of the infant and toddler mortality review instrument in a web-based Health Facility using the User-Centered Design method. The design of a web-based application prototype using the User-Centered Design method can make it easier for users to understand the workflow and application functions with just one try, even though the User-Centered Design method is a new paradigm in designing web-based applications Yatana Saputri et al. (2017). It is because the User-Centered Design method emphasizes and optimizes application prototypes according to the needs and desires of end-users. The design results using the User-Centered Design method adapt the behavior or behavior of live birth users or end-users in application prototypes so that they do not force live birth users or end-users to change behavior or behavior when using the application prototype.

Research conducted by Bastian et al. (2021) concluded that using the UCD method in making user interfaces that involved users was very helpful in making the expected User Interface. It means that with the help and contribution of users, the designer will find it easier to create a User Interface according to user needs and desires. It is supported by research conducted by Apridiansyah & Gunawan (2019) and Iqbal et al. (2020), who said that applications using the UCD method could facilitate users in conducting their needs and desires.

**RESEARCH METHODS**

**Types of Research**

The type of research conducted is descriptive research. Descriptive research is a method used to describe the existing phenomena as accurately as possible, and the researcher collects the available Data through research instruments such as questionnaires, interviews, or even observation (Atmowardoyo, 2018).

**Time and Place of Research**

The research was located in Banyuasin and Musi Banyuasin Regency, and this research was about nine months (November 2021 to July 2022).

**Research Subject**

The research subjects can be interpreted as traits, values, or attributes with a variable contained in a person, object, or activity that can be studied and concluded (Tanujaya, 2017). The subject of this research was Health Workers from Banyuasin and Musi Banyuasin Regency. The research subject was obtained from Program Kerja Sama (PKS) of the Directorate of Family Health of the Ministry of Health of the Republic of Indonesia and the Faculty of Public Health of Sriwijaya University.

**Data Collection Techniques**

Various approaches, methods, and data collection techniques can produce data in various research reports, such as tests, questionnaires, interviews, observations, and document analysis (Fauzi & Pradipta, 2018). The data collection techniques used in this research are discussion and interview. The discussions were held with health workers through Focus Group Discussions (FGD), and in-depth interviews were held with chosen health workers.

**Application of User-Centered Design (UCD) for Prototype Development Method**

Figure 1 shows the workflow of prototype development using the UCD method. The following is the explanation of each stage as follows.

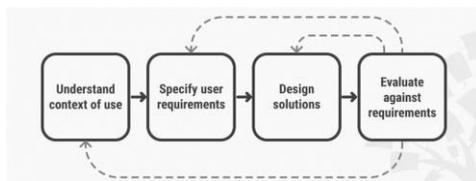


Figure 1. User-Centred Design Workflow  
Source: (Risald et al., 2018)

1. Understand the context of use. The basis of UCD is understanding the intended users of the

- product and the environment in which they are used. Identify user characteristics and user groups, possible characteristics. At this stage, the researcher made a user persona and a Point of View (POV) using the Figma application.
2. Specify user requirements. This stage is the stage of extracting information to gather user needs. Then, the arrangement of users' needed information is translated into various forms or techniques, such as narratives, diagrams, and others. At this stage, the researcher made an affinity diagram using the Miro application.
3. Design solutions. At this stage, sketches, simulations, and prototypes are used to make ideas visible and facilitate effective communication with users. When a design solution is presented to the user, the user must be allowed to perform the task. User feedback collected should be included in the improvement of the design solution. It must be repeated continuously until the design objectives are met. At this stage, the researcher made a prototype using the Figma application.
4. Evaluate against requirements. The design solutions carried out in the previous stage are evaluated in the last stage. Its purpose is to generate feedback further to improve the product and determine whether the design meets specified user requirements and usability purposes and conforms to general usability guidelines. The UCD process cycle continues as long as usability objectives are not met. At this stage, the researcher held Usability Testing (UT) for the users using the Maze application. Maze also provides an analysis that helps the researcher to conclude the prototype. Kinne (2022) explained that a high usability score indicates that the design will be easy to use, intuitive, and efficient. For the analysis, Maze calculates the score using Mission Usability Score (MIUS) and Maze Usability Score (MAUS). The formula of MIUS:  

$$MIUS = DSR + (IDSR/2) - AVG(MC\_P) - avg(DU\_P) \dots\dots\dots (1)$$
5. Which has these variables, DSR for Direct Success Rate, IDSR for Indirect Success Rate, avg for the average, MC\_P for misclick (MCR) penalty =  $MCR * 0,5$ , and DU\_P for duration penalty =  $(MIN(10, MAX(0, (AVGD-5)/2)))$ . The formula of MAUZ is  $MAUS = avg(MIUS)$ . However, do not be confused by the formulas because Maze has automatically shown the score of MIUS and MAUS on the project report. So, it becomes easier to analyze without being confused about calculating using formulas. The



total score in the Maze is called Maze Usability Score (MAUS), and the detail of grade and range shows in table 1.

Score Grade	Score Range
Low	0-50
Middle	50-80
High	80-100

Source: (Glowdy et al., 2020)

## RESULTS AND DISCUSSION

### The result of The User's Persona

The user Persona in Figure 2 results from understanding the context of use in the user-centered Design method.



Figure 2 User Persona

Figure 2 shows the user persona of this research. Her name is Ardika Pratiwi. She is a 33 years old doctor and a Person In Charge (PIC) of Quality and Audit from Gasing Health Service Facility. Her goals are (1) Can fill out the infant and toddler mortality review instrument more easily and attractively and (2) Can search and find death case data more easily and quickly. Her frustrations are (1) The amount of data that must be filled in sometimes makes the person responsible for filling it confused, and (2) Errors often occur when recording or reviewing using a manual system.

### The result of The Point of View

The point of view in Figure 3 results from understanding the context of use in the user-centered Design method. Figure 3 shows the Point of View (POV) of this research. This POV states that health workers who want to record or review cases of infant and toddler mortality in health service facilities **need** a recording or review instrument that is easy to understand, interesting to look at, and easy to find and find data **because** the conventional or

manual recording system has several shortcomings, such as errors in the record.



Figure 3 Point of View

### The result of The Affinity Diagram

Figure 4 shows the affinity diagram of this research. The features needed are Add New Report and Search and View Data. "Add New Report" is the top priority, and "Search and View Data" is the middle priority. The users also gave insights, like color options, simple and attractive design, understandable flow, and clear text or font.

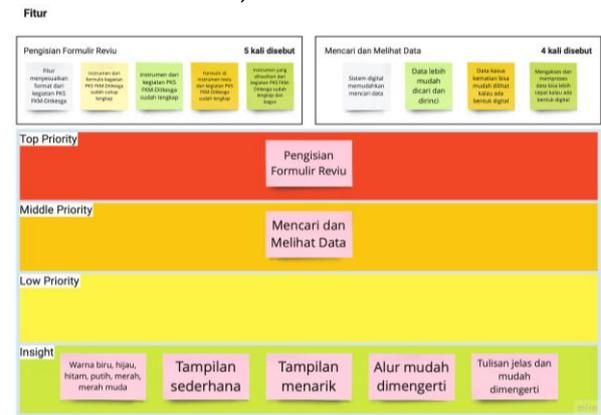


Figure 4 Affinity Diagram

### The result of The Prototype Designs and How The Prototype Works

Prototype designs in Figures 5 to 8 are the result of the stage design solutions in the User-Centered Design method.

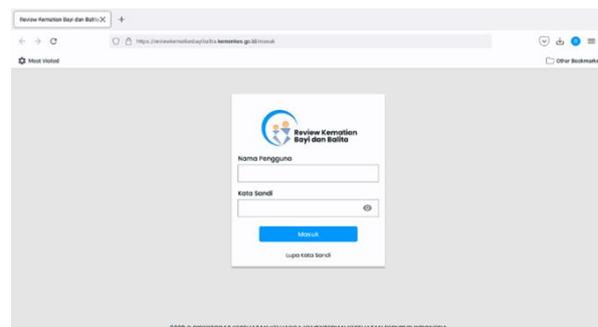


Figure 5 Login Page

Figure 5 shows the Login Page. The user should input the username and password on this page to access the application. If the user forgets the password, the user can reset the new password by clicking the text button Forget Password.

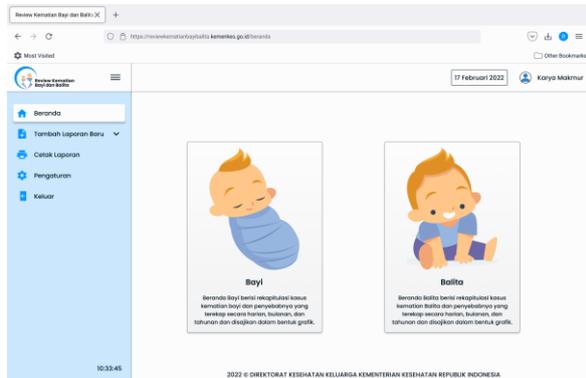


Figure 6 Homepage

Figure 6 shows the Homepage view. On this page, the application's main features are shown so the users can immediately find out what features can be used in this application. The infant and toddler home contains a recapitulation of mortality cases and the causes, which are recorded daily, monthly, and yearly and presented in graphical form.

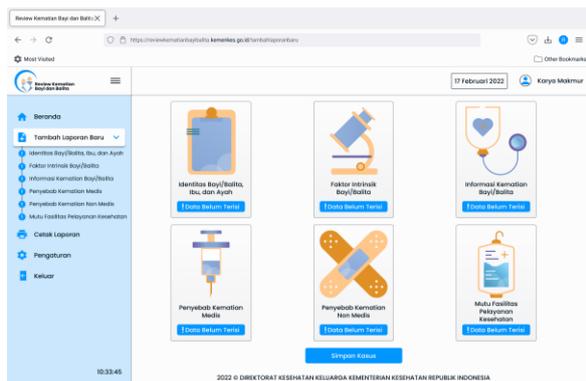


Figure 7 "Tambah Laporan Baru" or Add New Report Page

Figure 7 shows the page of "Tambah Laporan Baru" or Add New Report. On this page, users can insert the needed data into each form. The forms are (1) Identity of Infant/Toddlers, Mothers, and Fathers, (2) Infant/Toddler Intrinsic Factors, (3) Infant/Toddler Death Information, (4) Medical Causes of Death, (5) Non-Medical Causes of Death, and (6) Quality of Health Service Facilities.

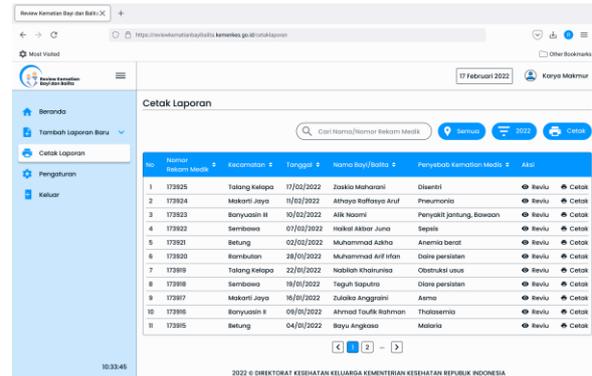


Figure 8 "Cetak Laporan" or Print Report Page

Figure 8 shows the page of "Cetak Laporan" or Print Report. On this page, users can choose the range (day, month, or year) of information that users want to print.

### The Analysis from Maze

Analysis from Maze in Table 2 results from the stage evaluation against requirements in the User-Centered Design method. To help the researcher with the Usability Testing (UT), the users tested using task and scenario, and Maze will report after the testing is done. Table 2 is the conclusion of the analysis from Maze:

Table 2 Task and Score of Maze Analysis

Name of Task	Score
Login to Application	97
Explore Homepage	87
Add Identity of Infant/Toddlers, Mothers, and Fathers Data	97
Add Infant/Toddler Intrinsic Factors Data	99
Add Infant/Toddler Death Information Data	96
Add Medical Causes of Death Data	92
Add Non-Medical Causes of Death Data	96
Add Quality of Health Service Facilities	88
Save Case	100
Print Report	89
Average	94

Based on Table 2 above, the average score obtained 94 with a High grade. The score that reaches a High grade describes what the users can easily use in terms of user appearance and user experience. The prototype is also made according to the needs and desires of the end-user and the prototype is feasible to be implemented.

### CONCLUSIONS AND SUGGESTIONS

#### Conclusion

Based on the research, the researcher concludes that the User-Centred Design (UCD) method can be applied to the recommendations for the prototype design of the web-based Infant and Toddler Mortality Review Instrument application

for Health Facilities in Banyuasin and Musi Banyuasin Districts. It means that the prototype of this application has been made according to the needs and desires of the end user, also the prototype of this application is feasible to be implemented. The results of the Usability Testing support it or UT of each given task and the average final usability score is 94.

### Suggestion

The researcher realizes that this research still has shortcomings. Therefore, the researcher would like to advise other writers if they want to do research similar to what the researcher did. The suggestions are explored or try to use other design methods in conducting similar research to get a comparison of which design method best suits the needs and desires of the end-user, conduct further research related to the needs and desires of end-users to add other features that can help optimize the use of the Infant and Toddler Mortality Review application in handling cases of infant and under-five mortality in health facilities throughout Indonesia, dare to explore more colors to give a more attractive appearance, but still, pay attention to user comfort and the final function of the application prototype, and carry out further development so that a functional application can be implemented directly in the community and its efficiency can be seen in handling cases of infant and under-five mortality reviews for health facilities throughout Indonesia.

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