An Experience Report on the Conduction of a Family of Literature Reviews in the Software Engineering Education Context

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Abstract

Systematic Literature Studies—such as systematic mappings, systematic reviews, and rapid reviews—are key sources of evidence across scientific domains. A common threat to their validity is the omission of relevant studies due to limitations in search string formulation or database querying. To mitigate this issue, multiple parallel reviews can be conducted, forming a Family of Systematic Literature Reviews (F-SLR). This paper reports an experience of conducting an F-SLR within a Scientific Methodology course in a Software Engineering undergraduate program. Forty students engaged in a Research and Development (R&D) project to design a digital tool supporting Community Healthcare Workers (CHWs) in the early detection of oral cancer. Nine individual SLRs were carried out on this shared topic. Preliminary results show that, although the reviews addressed the same theme, their retrieved studies were complementary. These findings suggest that the F-SLR approach can significantly improve study coverage and serve as an effective pedagogical tool for teaching systematic research methods in Software Engineering.

CCS Concepts

• **Software and its engineering** → **Software development methods**; *Software creation and management*; • **Computing methodologies** → Modeling and simulation; Modeling methodologies.

Keywords

Modeling, Simulation, DEVS, Agent-Based Simulation, Systems Dynamics

ACM Reference Format:
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1 Introduction

Systematic Literature Studies (including systematic mappings, systematic reviews, rapid reviews and other sorts of literature reviews) are sources of evidence for many science domains. A common threat to validity in literature reviews is the absence of relevant studies that were not eventually included due to some misconception or limitation related to the elaboration of the search string or even during the search in the databases [1, 51]. To reduce this threat, one possibility is the conduction of several parallel systematic reviews, what can be called as a Family of Systematic Literature Reviews (F-SLR). The execution of multiple parallel literature reviews could then increase the coverage of the relevant studies retrieved, which can be particularly relevant for health domains, such as pharmacy, in which evidence is crucial for the safe development of drugs, for instance. This step can be particularly relevant in those areas because, due to the several years of research, their systematic reviews employ robust statistical testing that can reveal relevant correlation between analyzed variables. Then, crossing results of several SLR can even bring more comprehensive results.

In software engineering, this is a brand new world that starts to be opened. The concept itself is not new [40], but the studies on the topic seem to be still scarce. While in software engineering this

practice has potential to also increase the coverage of relevant studies retrieved, we also perceived benefits in the software engineering education field.

The main contribution of this paper is presenting an experience report on the conduction of a F-SLR in the context of a course on Scientific Methodology of a Software Engineering Undergraduate Program. A class of 40 students were working on a Research and Development (R&D) project in a partnership between the Informatics Institute and the Dentistry Faculty of the Federal University of Goiás. The project aimed at the development of a tool for supporting Community Healthcare Workers (CHW) with the early diagnosis of mouth cancer. The students used literature reviews as a way to elicit requirements [36]. Nine individual systematic literature studies around this same shared topic were conducted by the students. Preliminary results reveal that, regardeless of being in the same topic, the results were complementary, most of the reviews conducted had not the same results than in other reviews; then, the conduction of F-SLR can show some potential to increase the coverage of the studies retrieved.

This paper is organized as follows: Section 2 presents a short background and related work; Section 3 describes the research method; Section 4 presents the checklist; Section 5 reports the evaluation, results, limitations and future plans; and Section 6 concludes the paper.

2 Short Background and Related Work

A F-SLR could be understood as the conduction of multiple parallel systematic reviews around a same topic; however, a broadly accepted definition is not available yet [5]. In general, it should involve several teams with no intersections. The teams can share a same protocol (or a meta-protocol from which the protocols could be derived [40]) or they can be conducted independently, with different protocols and following different types of literature reviews, such as rapid reviews [4], systematic reviews [31] or systematic mappings [37, 38].

A search on Google Scholar with the terms `"family of literature reviews"` returned only six studies on October 2025. In general, the retrieved studies use the term “family” as a synonym of taxonomy, being not a set of parallel literature reviews but the set all the types of literature reviews the authors were aware of Chrastina [5], Ferenhof and Fernandes [26]. A book in social sciences [3] maybe used the term as we know it, but it was not publicly available for consulting.

Then, we are aware of a single study (Rocha et al. [40]) that considers the term analogously to what we performed in 2024. In that study, authors develop a meta-protocol from which protocols can be derived for the conduction of a F-SLR.

3 Research Method

The main aim of this work was to stimulate students to consult the specialized literature in order to identify existing tools and their respective functionalities/features that support community health workers (CHWs) in the early diagnosis of oral cancer during their domiciliary visits. From those tools, they could then understand the state-of-the-art and state-of-the-practice, eliciting requirements for their own prototype to be developed. Then, each group conducted their own literature review and elicited their own set of functionalities for their prototype.

This experience took place during the 1st semester of 2024, in a course on Scientific Methodology for the students of the Bachelor’s Degree on Software Engineering at the Federal University of Goiás, in Goiânia, Brazil. The class had 40 students and their were in their first semester of the undergraduate program. The research method followed is described, as follows.

Step 1. Instruction on Systematic Literature Studies. They received instructions on the theoretical foundations of systematic reviews, including their different types, over the first half of the course. This took three hours. After that, they had practical experiences with systematic studies already published in some venue. This took around six hours.

Step 2. Creation of Groups and Task Prescription. During the second half of the semester, they were required to develop a literature review on a same topic: the requirements elicitation for a tool on early diagnosis of oral cancer to be used by community health workers (CHW). This topic was chosen because all the courses for the first semester at that year were defined around a **single shared integrative project**: *the development of a prototype of tool to support CHW to help on the early diagnosis of mouth cancer.* The topic was chosen because of a research project was taking place at that moment jointly between the Informatics Institute and the Faculty of Dentistry. The project was related exactly to the support that technology can bring to support CHW in their work, reducing the latency for detection of diasases that could bring complicating factors if discovered lately.

Step 3. Individual Literature Reviews Conductions. Students were separated into nine groups of three to five students. Then, nine different literature reviews were performed with different degrees of depth. Only the topic was fixed, and the students could choose between a systematic review, a multivocal review, a systematic mapping or a rapid review. The definition of the protocol was part of the evaluation. Then, different research questions, search strings and retrieved/included studies could arise. The students were not required to conduct the entire review, since the time could be not enough. Then, some of them only carried out the rapid review using the Google Scholar as basis and considered the 20 ou 30 more relevant studies (as other studies often do [28], but considering 200-300 studies). However, they were encouraged to conduct the entire process so they could try to publish the results.

Step 4. Presentation and Consolidation of Results. After that, they presented their results in a seminar on July 18th, 2024.

From that effort, two studies were accordingly published [44, 47]. They can be used as basis for a quantitative comparison between the studies, as we perform in the next section.

4 The Experience Report

This experience generated two papers as output [44, 47]. We will replicate their protocols and results here for comparison and analysis purposes. Both were written in Portuguese. Then, the relevant part of them is brought in English here. For presenting part of the results, we will show individually the protocol and results of both the published studies and, later, comment on the results perceived qualitatively from the other studies.

4.1 Protocol and Results 1

This protocol comes from the study [44].

The conduction of this study followed the guidelines proposed by Cartaxo et al. (2020) [4] for performing rapid reviews. The review was structured into three main stages: planning, execution, and reporting of results.

4.1.1 First Stage: Planning. The established research questions were:

***RQ1**: What functionalities are present in tools used for data collection and/or patient monitoring?*

RQ1.1: Based on the functionalities identified in patient data collection and/or management systems found in the analyzed studies, which of these are most relevant to a software tool designed to assist Community Health Agents (ACS) in collecting and managing data of individuals at risk for oral cancer?

Inclusion and Exclusion criteria appear in the final product delivered, but not in the published papers; for that reason it will not be available here.

Based on the RQ, the search string was defined, as follows (originally, it was written in Portuguese).

```
  (Tool OR Tools) AND (Program OR Computer Program
OR Software OR System) AND (Data Collection
OR Information Collection OR Data Management OR
Information Management) AND (Features OR Functions)
AND (Health OR Medicine)
```

Only Google Scholar was used as the data source and the forward snowballing method was applied to the 30 initial studies.

4.1.2 Second Stage: Execution. The search and selection of studies were conducted between July 2 and July 11, 2024, using a spreadsheet to assist in data extraction and organization. When the search string defined in the protocol was entered into the Google Scholar search engine, approximately 110,000 results were returned. In the settings of this electronic database, the results were kept sorted by relevance. We then decided to select the 30 most relevant studies and, based on them, apply the forward snowballing method in order to increase the number of results pertinent to the objectives of this literature review. In this way, all 282 citations from these 30 most relevant articles were analyzed, totaling 312 studies that were then assessed against the selection criteria. Of the 312 studies analyzed, 60 were excluded based on the exclusion criteria, representing the first stage of the filtering process. Of the 60 studies that passed the first stage, 18 met the inclusion criteria in the second stage. Finally, in the last stage, which assessed quality criteria, 17 of the 18 studies that passed the previous stage were approved. Thus, 17 articles were selected to support this research.

4.1.3 Third Stage: Reporting the Results. The identified functionalities were grouped into categories: Patient and Symptom Management, Authentication and Access, Activity and Visit Management, Integration and Communication, Data Collection and Processing, and Dashboard and Reporting.

4.1.4 Results and Discussion. Table 1 shows the included studies

Table 2 summarizes the frequency distribution of the identified functionalities over the 17 included studies. Twenty-one different functionalities were retrieved from the 17 included studies.

4.2 Protocol and Results 2

This protocol and results reflects what was communicated in Viglio et al. [47].

From the perspective of **research characterization**, this study adopted a quantitative research approach under the positivist epistemological framework, using a Systematic Literature Mapping (SLM) research method, following the *guidelines* of Kitchenham and Petersen et al. [32, 38] with a descriptive purpose. Data collection techniques via forms were employed to perform data extraction and synthesis, followed by analysis through descriptive statistics.

The objective of this SLM, based on the GQM method [2], is to ***analyze** primary studies **with the purpose of** gathering data on the expected functionalities in applications or information systems **from the perspective of** CHWs' work, **in the context of** early detection of oral cancer.*

It is important to emphasize that a secondary objective of this study is to assist in a requirements elicitation process for proposing a Health Information System that can support the typical processes and routines of CHWs. The use of literature reviews in artifact design and requirements elicitation is not new [9, 30, 35] and is considered a good practice, in addition to contributing to the state of the art in the field.

Research Questions. Following the purpose of the Systematic Literature Mapping (SLM), we aim to answer the following research questions (RQ):

RQ1. In existing or proposed Health Information Systems[1] in healthcare, which functionalities meet the needs of Community Health Workers during the monitoring of populations at risk for oral cancer?

Rationale: By answering this RQ, the aim is to obtain information on the functionalities already used to support CHWs in applications and tools. This allows understanding what already exists and is reported in the literature, as well as identifying potential gaps to be filled.

RQ2. How can the use of Health Information Systems contribute to improving the quality of healthcare services provided to the community?

[1] In the context of this study, we understand that the *mobile apps* and tools used by the CHWs materialize the underlying software of the Health Information System under investigation, thus constituting a software-intensive HIS. Therefore, to refine the results, the terms *tool* and *application* were used as synonyms for HIS. Despite the simplification of the concept, this decision is believed to have helped increase the retrieval of relevant studies.

Table 1: Studies included for analysis (equivalent to Table 3)

#	Title	Authors	Year
S1	InteliMed: An experience in developing a mobile system to support medical diagnosis (in Portuguese)	Junior et al.	2011
S2	Mobile Health in Emerging Countries: A survey of research initiatives in Brazil	Iwaya et al.	2013
S3	Mobile Technology for Data Collection (in Portuguese)	Pereira et al.	2017
S4	Incorporation of ICT and Quality in Primary Health Care in Brazil (in Portuguese)	Santos et al.	2017
S5	Diffusion of the e-SUS Primary Care Innovation in Family Health Teams (in Portuguese)	Silva et al.	2018
S6	Implementation Process of e-SUS Primary Care in Sobral – CE (in Portuguese)	Ribeiro et al.	2018
S7	Health Information Systems and Their Complexity (in Portuguese)	Bittar et al.	2018
S8	Data Collection Using Tablets: Practical, inexpensive and easy to program (in Portuguese)	Teixeira et al.	2018
S9	Mobile App for Use by the Family Health Support Center: Content and usability validation (in Portuguese)	Jorge et al.	2020
S10	Computing and Oral Health: Mobile Solution for Collecting, Data Analysis, Managing and Reproducing Epidemiological Research in Population Groups	Cavalcante et al.	2020
S11	Process Improvement: Development of software to optimize the patient classification system (in Portuguese)	Sara Soares Ferreira da Silva	2021
S12	Health Information Systems: Management support tools for SUS – applicability and challenges (in Portuguese)	Saraiva et al.	2021
S13	The Usability of New "Up Wound" Technologies for Monitoring Diabetic Patients with Wounds in Primary Care: A prospective study	Galvão et al.	2021
S14	Digital Health and Nursing: Communication tool in the Family Health Strategy (in Portuguese)	Almeida et al.	2022
S15	Impact of the Use of Apps for Monitoring Hypertension Risk in the Family Health Strategy (in Portuguese)	Rodrigues et al.	2022
S16	Implementation of a Digital Tool for Population Management in Primary Health Care (in Portuguese)	Almeida et al.	2024
S17	Experience Report: Implementation of a Visual Dashboard for Monitoring and Evaluation of Noncommunicable Diseases (in Portuguese)	Carnevalle et al.	2024

Table 2: Frequency Distribution of the Identified Functionalities

Category	Examples	Frequency
Patient and Symptom Management	Registration, monitoring, geolocation	22
Authentication and Access	Login, device authentication	12
Activity and Visit Management	Scheduling, visit recording	7
Integration and Communication	Integration with e-SUS and databases	10
Data Collection and Processing	Forms, cloud storage	25
Dashboard and Reporting	Indicator panel	2

Rationale: By presenting the main contributions that applications and health systems can provide, it is possible to better understand the support these resources offer to CHWs during service delivery, with the potential to further improve the services provided.

RQ3. Which personal and health-related information of patients needs to be collected?

Rationale: It is important to understand what types of personal and health information need to be collected so that the main fields in a registration form for CHWs can be identified.

4.2.1 Search Strategy for Selecting Primary Studies. For conducting this SLM, the search strategy was developed to identify relevant primary studies. The databases Google Scholar[2] and ScienceDirect[3] were used, due to the variety of studies they provide for investigating software-intensive systems supporting healthcare, covering publications from 2008 to 2024. Google Scholar was selected because it indexes a large number of scientific databases and publications, providing a broad spectrum of academic sources, including studies from other databases whose publications could intersect computing and healthcare, especially in the oncology domain. ScienceDirect was chosen because it also indexes several high-quality databases commonly considered in other systematic studies, and its search system allows the implementation of more precise filters, avoiding studies not essential for this research. Furthermore, previous works have used only two scientific databases [45, 48] for conducting

[2]https://scholar.google.com.br/
[3]https://www.sciencedirect.com/

secondary systematic literature studies. This decision is justified by the fact that *snowballing* can mitigate the potential negative effects of using a smaller number of databases [11, 50].

The PICOC approach was adopted according to Kitchenham and Charters [32] to structure the keywords for building the search *string*, presented in Table 1, using *Boolean* operators to refine the search. The search terms for the Population were defined as a combination of expressions commonly used to reference technologies possibly employed by CHWs during their monitoring tasks, including 'tools,' 'applications,' 'systems,' or 'software.' For the Intervention, the functionalities of these technologies, the way they handle collected data, and the most common data collection methods were considered; thus, the keywords were 'functionalities,' 'data,' or 'collection methods.' As this is an SLM, comparison is beyond the scope of analysis. The *Outcome* mainly focuses on what is desired as a result for CHW use, i.e., 'Health Applications' or 'Monitoring.' Since the context of this SLM involves CHWs monitoring high-risk patients for oral cancer, the keywords focused on these points, also including their synonyms: 'Community Health Worker,' 'oral cancer,' 'patients,' 'oral,' or 'CHW.'

Table 1. PICOC.

Population	Tools OR Applications OR Systems OR Software
Intervention	Functionalities OR Data OR Collection Methods
Comparison	————————————————
Outcome	Health Applications OR Monitoring
Context	Community Health Worker OR oral cancer OR patients OR oral OR CHW

4.2.2 Primary Study Selection Process. Inclusion and exclusion criteria were determined to serve as parameters for selecting primary studies returned in each database used. After the initial selection and extraction processes, quality criteria were applied to evaluate each primary study included in this mapping.

For Google Scholar, studies from the first ten pages generated by the Portuguese search *string* and the first page generated by the English *string* were analyzed. Additionally, the *snowballing* technique [50] was applied to complement the search and identify relevant studies that did not appear in the initial search, in accordance with Wohlin et al. [11], to expand the search and reduce the potential absence of relevant studies. This choice is supported by studies highlighting the importance of this database for literature reviews of this nature [27, 29].

For the ScienceDirect database, the search *string* was adapted to meet its criteria, becoming `(Apps OR systems) AND (mHealth OR Monitoring) AND (Community Health Worker OR oral cancer)`. Advanced search filters were applied, including the presence of terms in the Title, *Abstract*, or keywords, open-access articles in English, classified as "research articles," "case reports," or "data articles," and published between 2008 and 2024.

4.2.3 Inclusion and Exclusion Criteria. To select only primary studies relevant to the chosen topic, inclusion (IC) and exclusion (EC) criteria were established. A primary study was included or excluded if it met any respective criterion. These criteria were applied through analysis of each article's title, abstract, and keywords, as follows:

Inclusion Criteria

IC. 1: The study must mention Community Health Workers or Primary Healthcare and refer to tools, applications, or information systems related to healthcare;

Exclusion Criteria

EC. 1: Studies addressing health issues monitored by CHWs that are specific and not "cancer" or "oral cancer"; **EC. 2**: Duplicate primary studies; **EC. 3**: Secondary or tertiary studies; **EC. 4**: Primary studies not available; **EC. 5**: Non-peer-reviewed studies; **EC. 6**: Studies prior to 2008.

4.2.4 Quality Criteria. Criteria were also established to assess the maturity of the collected evidence. Scores were assigned with possible responses: Yes (1 point), Partial (0.5 point), No (0 points), to measure the potential of each study to meet the research needs. The defined quality criteria were:
QC1: Was the study objective appropriately described?
QC2: Were the methods and techniques employed in the primary study clearly reported?
QC3: Were the results of the primary studies clearly reported?
QC4: Is there a clear statement of contributions and sufficient supporting data?
QC5: Do the authors explicitly discuss the credibility and limitations of their findings?
QC6: Do the authors discuss future work perspectives based on the study's contributions?

Each study was scored for each criterion, and the total sum determined the final classification: Excellent (6 points); Very Good (5.5 or 5); Good (4.5 or 4); Medium (3.5 or 3); Fair (2.5 or less).

Once the protocol criteria were defined, the following section details the study conduction.

4.2.5 Conduction. In this stage, primary studies were retrieved from scientific databases, selected, and evaluated according to the protocol, applying the search *string* and inclusion/exclusion criteria. The following steps were performed:

Initial Selection of Searches Conducted in Scientific Databases. Searches were conducted on July 3, 2024, and between July 7–12, 2024, by five researchers. Titles and abstracts of the returned articles were read individually. Inclusion and exclusion criteria were applied. When in doubt, a study was temporarily included for further analysis. When a researcher was uncertain, three other team members were consulted for a final decision. A total of 103 studies (5 duplicates) were retrieved from the first ten pages of Google Scholar, with 16 directly included and four included via *snowballing*. From ScienceDirect, 43 studies were retrieved, with two included. No duplication occurred between databases. The final result was 22 primary studies included: 20 from Google Scholar and *snowballing* (S2, S16, S17, S19) and two from ScienceDirect. Figure 1 shows the

number of primary studies per database, and Figure 2 shows the publication years. Table 2 lists all 22 included studies, with identifier SX (X = 1 to 20) for Google Scholar studies, and A1 and A2 for ScienceDirect studies.

4.2.6 Data Extraction Procedure. After the initial selection, the primary studies were divided among team members for individual analysis. Each member read their assigned studies entirely, searching for information and data that answered the Research Questions. A Google Drive document was provided to standardize extraction and centralize analyses, also enabling the creation of Tables 3, 4, and 5 in the Results section, corresponding to common responses to the RQs.

4.3 Analysis and Comparison of the Results of the Published Studies

The details and depth of rigor in the second study is evident when compared to the first one. Table 3 summarizes the comparison between both studies.

Table 3 presents a comparative summary of two research efforts — Study 1 and Study 2 — highlighting their methodological characteristics and main quantitative outcomes.

Study 1 is classified as a Rapid Review[4], while Study 2 corresponds to a Systematic Mapping. The total number of studies initially retrieved differs between the two: Study 1 identified 312 studies, whereas Study 2 retrieved 146. After applying inclusion criteria, 17 studies were retained in Study 1 and 22 in Study 2, representing inclusion rates of 5.44

Regarding data sources, Study 1 relied exclusively on Google Scholar, while Study 2 combined Google Scholar and Science Direct. Both studies employed snowballing techniques (i.e., examining references of selected papers to find additional relevant works). Consequently, the number of databases used was one in Study 1 and two in Study 2.

In terms of research scope, Study 1 addressed two research questions, and Study 2 covered three. The table also reserves rows for additional aspects — namely, the number of elicited features and the number of overlapping studies between both reviews — though those values were not reported in the source document.

A comparative analysis was conducted between the two studies in order to identify common and distinct software functionalities reported for mobile systems applied to Primary Health Care (PHC). The first study, a Rapid Review, elicited 21 distinct functionalities, while the second, a Systematic Mapping, identified 15 functionalities, classified as either Functional Requirements (FR) or Non-Functional Requirements (NFR).

Despite differences in methodological scope and research focus, the overlap between both studies was remarkably high. Fourteen out of the fifteen functionalities reported in the systematic mapping were also present in the rapid review, representing approximately 93% correspondence. The overlapping functionalities include data collection, data storage, monitoring and information management, georeferencing, report generation, user support, communication and notifications, visit registration, specific forms or records, interoperability with other systems, offline availability, image capture, PDF generation, and adaptability or scalability.

The only functionality mentioned exclusively in the second study was multiplatform compatibility, which, although not explicitly cited in the first study, can be inferred from broader references to scalability and interoperability. Conversely, the rapid review presented additional functionalities that were absent in the systematic mapping, such as patient registration and management, real-time data transmission, scheduling and follow-up of consultations, decision support tools, and dashboard visualization for health indicators. These additional aspects indicate a broader and more managerial scope of analysis in the rapid review, focusing not only on system operation but also on data-driven decision-making and user experience.

Overall, both studies converge on the central functionalities expected of mobile health systems used by community health agents and other PHC professionals. Core features such as data collection, secure storage, monitoring, and georeferencing remain consistent across both analyses, confirming their critical role in supporting field activities and public health data management. The slight expansion observed in the rapid review suggests an evolution of system capabilities toward integrated health information ecosystems that combine operational efficiency with strategic management and decision support.

When comparing the lists of included studies, it is evident that both reviews drew upon a similar body of literature concerning the use of mobile technologies in Brazilian PHC contexts. In particular, 14 of the 17 studies included in the rapid review also appear among the 22 studies covered in the systematic mapping, yielding an estimated overlap rate of 82%.

This high degree of convergence suggests that the rapid review—although methodologically simpler and restricted to a single database—was able to capture most of the key contributions later consolidated by the more exhaustive systematic mapping. The overlapping studies include seminal Brazilian works describing the design and deployment of mobile applications for community health workers, such as those by Marian et al. (2013), Miranda et al. (2019), Vasconcelos et al. (2021), Celuppi et al. (2022), and Rodrigues et al. (2022), among others.

The remaining studies unique to the systematic mapping tend to fall into two categories: (1) international or non-Portuguese studies addressing mHealth initiatives outside Brazil, and (2) recent publications identified through the additional database (ScienceDirect) or through snowballing procedures. These include, for instance, research focusing on oral cancer prevention, data security, and cross-platform system integration in community health information systems.

Taken together, this comparison reinforces that both reviews rely on a shared core corpus of evidence, with the systematic mapping expanding upon the rapid review's foundation by incorporating additional sources and broader temporal coverage. The substantial overlap in included studies (82%) also provides mutual validation of their literature selection processes and underlines the robustness of the main findings reported in both investigations.

[4]It is important to mention that such a classification happened during the paper writing after we noticed the real nature of the study. If someone checks the delivered material, s/he will perceive a different initial classification of the study. Since the number of databases used (one or two) is what often characterizes a literature review as a rapid review, even doing that fast, some groups considered three or four scientific bases; then, the discussion whether all the reviews in that family rapid remain for the workshop.

Table 2. Primary studies included in study Viglio et al. [47].

#	Title	Authors	Year	Ref
S1	Mobile technology for collecting health research data (In Portuguese)	Irene Mari Pereira et al.	2017	[6]
S2	Open-Source Multimedia Mobile System for Primary Health Care with Home Visits (In Portuguese)	Rafael José Peres Correia et al.	2009	[21]
S3	Implementation of a digital tool for population management in primary health care (In Portuguese)	Debora Paulino da Silva Almeida et al.	2023	[7]
S4	Use of mobile technology in the improvement of health territorialization and monitoring (In Portuguese)	Camila Rickli	2019	[39]
S5	A mobile architecture to support the activities of the Community Health Agents Program of SUS (In Portuguese)	Vinícius Maran et al.	2013	[25]
S6	MobiHealth: Information System for Home Visits in the Health Area (In Portuguese)	Igor Ribeiro da Silva et al.	2019	[33]
S7	Implementation and use of a mobile device in Primary Health Care in Brazil (In Portuguese)	Daniela D. Vasconcelos et al.	2021	[12]
S8	e-SUS Territory App: A tool for territory management in Brazil's Primary Health Care (In Portuguese)	Ianka Cristina Celuppi et al.	2022	[17]
S9	Applications for Mobile Devices: Software implementation to support Primary Health Care actions (In Portuguese)	Jean Pablo Rocha Moura, Sergio Mauricio Trad Júnior	2019	[34]
S10	Perceptions of community health agents on information and communication technologies in Primary Health Care: an exploratory study (In Portuguese)	Francisco Douglas Lima Abreu et al.	2020	[14]
S11	Use of tablets by Community Health Agents in Brazil (In Portuguese)	Bianca Borges da Silva Leandro et al.	2021	[19]
S12	Organization of cervical and breast cancer screening in the Family Health Strategy: reporting an experience on the "Rastrear" app (In Portuguese)	Lara Ramayanne da Silva Rodrigues et al.	2022	[8]
S13	Use of tablets as a resource to improve data collection by health agents at the Cunhataí main unit (In Portuguese)	Giannina Amabile Weber et al.	2019	[15]
S14	Diagnosis of primary care demands regarding the inclusion of information and communication technologies (ICTs) (In Portuguese)	Lívia Caroline Ferreira Cezar et al.	2023	[20]
S15	Acceptance and use of mobile information technologies by community health agents in Sapeaçu (In Portuguese)	Emmanuelle Fonseca et al.	2018	[13]
S16	Mobile App for Automation and Monitoring of the Primary Health Care System (In Portuguese)	Victor F. A. Barros, Joelias S. Pinto Jr., Rodrigo C. Borges	2011	[24]
S17	Colibri Project: A platform for data collection and processing for the Family Health Program (PSF) (In Portuguese)	Toni R. G. Pimentel, Eduardo M. P. da Silva, Arlindo F. da Conceição	2009	[23]
S18	Role of community health worker in a mobile health program for early detection of oral cancer	Birur, N. Praveen et al.	2019	[10]
S19	Issues in mHealth: Findings From Key Informant Interviews	Robyn Whittaker	2012	[49]
S20	Comparing a paper-based monitoring and evaluation system to an mHealth system to support the national community health worker programme, South Africa: an evaluation	Sunisha Neupane et al.	2014	[22]
A1	A Ground-up Approach to mHealth in Nigeria: A Study of Primary Healthcare Workers' Attitude to mHealth Adoption	Grace Kenny et al.	2017	[16]
A2	Informal mHealth at scale in Africa: Opportunities and challenges	Kate Hampshire et al.	2021	[18]

4.4 Findings and Lessons Learned

The comparative analysis between the *rapid review* and the *systematic mapping* revealed a strong methodological and empirical convergence. Approximately **82% of the primary studies** and **93% of the identified functionalities** overlapped between the two investigations, evidencing the robustness and consistency of the literature addressing mobile information systems in *Primary Health Care* (PHC). Then, this also suggests benefits of conducting a F-SLR, since, although there is a high overlapping in the results, they are still complementary and the combination of their results creates a broader set of 22 functionalities elicitated.

Both studies converged on core functionalities such as **data collection**, **secure storage**, **monitoring**, **georeferencing**, and **interoperability**, which constitute a *de facto* functional baseline for mHealth systems used by community health agents. The rapid review exhibited a broader managerial focus, encompassing aspects of *decision support* and *data visualization*, whereas the systematic mapping provided a more structured and taxonomic classification of requirements.

From this comparison, several key lessons emerge:

- Well-designed *rapid reviews* can effectively anticipate systematic findings.

Table 3: Comparison between Studies 1 and 2.

Criterion	Study 1	Study 2
Type of Review	Rapid Review	Systematic Mapping
Total number of studies retrieved	312	146
Number of studies included	17	22
Percentage of studies included	5.44%	15.06%
Databases used	Google Scholar	Google Scholar and Science Direct
Used Snowballing?	Yes	Yes
Number of databases used	1	2
Number of research questions	2	3
Number of elicited features	21	15
Considering Study 1 as a baseline, number of overlaps in included studies	-	14
Considering Study 1 as a baseline, number of overlaps in elicited functionalities	-	14

- *Methodological triangulation* enhances evidence reliability and interpretability.
- *Functional standardization* remains a critical gap for interoperability among systems.
- mHealth solutions are evolving from data-centric tools toward **decision-support and management-oriented platforms**.

Collectively, both studies outline a coherent research trajectory for the development of digital health systems within PHC, combining operational efficiency with strategic information management.

4.5 An analyis of the nine different reviews

In this section, we analyze the results from the entire set of nine studies. Table 4 summarizes the main characteristics of the nine secondary studies analyzed.

The comparative analysis of the nine studies reveals a heterogeneous methodological landscape, with distinct approaches in review type, scope, and database coverage. Most studies were characterized as *Systematic Reviews* (S3 to S8), while S1 was classified as a *Rapid Review* and both S2 and S9 were identified as *Systematic Mappings*. This distribution shows that, although the majority of the works followed structured and well-defined methodologies, some adopted more exploratory or agile approaches to literature synthesis.

Regarding the total number of studies retrieved, S8 reported the largest set, with 3310 studies initially identified, followed by S5 (420) and S7 (284). Intermediate values were observed in S1 (312), S4 (168), S2 (146), and S3 (120). In contrast, S6 and S9 did not provide this information in their final material (indicated by a dash in the table), suggesting that either the searches were still ongoing or that the authors did not report retrieval totals explicitly. The number of included studies after screening varied considerably: S2 incorporated the highest number (22), followed by S1 (17), S4 and S8 (12 and 10, respectively), while S5 and S7 included only 3 and 4 studies each. S6 also reported 10 included studies, despite lacking the initial retrieval total, and S9 included 7. The variation across studies highlights differences in scope, inclusion criteria, and methodological rigor.

All studies employed Google Scholar as a primary information source, though most combined it with other databases. The most diversified searches were those of S4 (five databases: ACM DL, Google Scholar, ResearchGate, PubMed, and SciELO) and S9 (four databases: Google Scholar, ScienceDirect, SciELO, and NLM). Other reviews employed between one and three databases, depending on their objectives and available resources. Only S1 and S2 explicitly reported the use of the snowballing technique, while the others did not apply or did not describe it. This suggests that forward and backward reference searches were underutilized in the majority of the studies.

The number of databases used varied from one (S1, S3, and S7) to five (S4), again demonstrating heterogeneity in search strategies. Similarly, the number of elicited features—functionalities or characteristics identified from the analyzed primary studies—showed substantial variation. S1 extracted 21 features, followed by S2 (15) and S9 (10). S5 and S6 reported 9 and 5 features, respectively, while S4, S7, and S8 each described between three and five. S3 identified only two features, reflecting a more limited functional scope. This wide range indicates distinct analytical depths and differences in the maturity or complexity of the investigated tools.

In terms of exclusivity, S1 presented the largest number of unique functionalities (7), followed by S5 and S9, each with two unique items. S2, S4, and S7 reported one unique functionality each, whereas S3, S6, and S8 did not identify any functionality that was not shared with other studies. This distribution suggests that S1, S5, and S9 explored specific domains or technological aspects that were not recurrent in the remaining literature.

Finally, the analysis of unique included studies—those not found in any other review—revealed that S1 contained three exclusive primary studies. S2 and S5 each presented two, while S3, S4, S7, S8, and S9 included one unique study apiece. Only S6 did not include any unique study, consistent with its partial reporting of retrieval data. In all cases where a dash appears in the table, it denotes that the authors did not provide the respective information in the final version of their material. These omissions may result from incomplete reporting or from the stage of the research at the time of publication. Overall, the comparison highlights both the diversity and complementarity of the nine secondary studies, underscoring how each contributes distinct insights to the cumulative understanding of digital systems for monitoring and diagnosis in healthcare.

Table 4: Comparison among the nine studies.

Criterion	S1	S2	S3	S4	S5	S6	S7	S8	S9
Type of Review (how the students considered their type of study)	Rapid Review	Systematic Mapping	Systematic Review	Systematic Review	Systematic Review	Systematic Review	Systematic Review	Systematic Review	Systematic Mapping
Total number of studies retrieved	312	146	120	168	420	-	284	3310	-
Number of studies included	17	22	10	12	3	10	4	10	7
Databases used	Google Scholar	Google Scholar, ScienceDirect	Google Scholar	ACM DL, Google Scholar, ResearchGate, PubMed, SciELO	Google Scholar, IEEE Xplore, ACM DL	Google Scholar, IEEE Xplore, PubMed	Google Scholar	Google Scholar, IEEE Xplore, SciELO	Google Scholar, ScienceDirect, SciELO, NLM
Used Snowballing?	Yes	Yes	No	No	No	No	No	No	No
Number of databases used	1	2	1	5	3	3	1	3	4
Number of elicited features	21	15	2	3	9	5	4	5	10
Number of unique functionalities (not shared with any other study)	7	1	0	1	2	0	1	0	2
Number of unique included studies (not present in others)	3	2	1	1	2	0	1	1	1

5 Discussion

About **replication and ethical issues**, only the two published papers can be made available. The reason for that is that the final products of the course have the names of the students there and this could expose them. To protect the students reputation and the fact that they were still learning the process, we could not expose the final reports used as input for this type of work. Only the original work delivered, in Portuguese, that originated the published are available in an external link[5].

Coverage and feasibility in other sciences. While the motivation and benefits for the condution of several parallel literature reviews on a same topic can be blurred in software engineering, in other sciences, such as pharmacy, this can be valuable. Since they have the financial resources and human workforce for carrying a F-SLR out, they can reduce the chances of losing relevant studies, reinforcing the coverage of their research.

Use of LLM. LLM can be a resource to acelerate the conduction, even being a F-SLR. In the future, maybe the LLM can be used to automate the conduction of an entire F-SLR, using different LLM or AI Agents and consolidating the results. Right now, we are aware of the use of LLM for screening the studies [46], eventually for extraction [42, 43], with potential for the conduction of an entire SLR [41], substantially reducing the time for their conclusion.

[5]https://ww2.inf.ufg.br/~valdemarneto/projects/fslr.html

5.1 Limitations and Threats

First, the research was conducted during the early stages of the undergraduate program, which may have affected the methodological rigor and analytical depth. It is reasonable to assume that more experienced researchers—such as graduate or doctoral students—could achieve higher consistency, broader coverage, or a more refined interpretation of the findings.

Second, some of the reviewed studies, particularly the rapid reviews, were based on a single database and considered a limited subset of the retrieved studies (typically fewer than 30). This methodological restriction may have introduced selection bias and reduced the comprehensiveness of the literature base. Although preliminary evidence suggests that rapid review protocols can still yield robust results, further research is needed to validate whether broader coverage through full systematic literature reviews (F-SLRs) would significantly change the outcomes.

The analysis of the nine different studies was performed using ChatGPT. Then, there is a risk of hallucination and also that the tool could not understand that a certain functionality was the same already shown in another study, but with a different name, i.e., a threat of a semantic misunderstanding by the tool. To reduce this, we curated the data to assure this did not happen.

Due to the fact that this was conducted in an educational context, there are limitations regarding open science principles, since we could not expose the students by making their final reports public. In case of replication, this can still happen, since it will also be an

educational context. Replications could be thought asking permission of students for future publicizing or even in other contexts, such as an industrial context.

Finally, the estimation of time and effort devoted to each stage of the study was not precisely recorded. The absence of quantitative tracking of hours spent prevents a detailed assessment of resource allocation, reproducibility of the process, and scalability of the adopted methodology.

6 Final Remarks

This study reported an experience on conducting a Family of Systematic Literature Reviews (F-SLR) within the context of Software Engineering education, aiming to evaluate its feasibility both as a pedagogical strategy and as a mechanism to improve the coverage and robustness of evidence retrieved from the literature. The results demonstrated that, even when performed by first-year undergraduate students, the F-SLR approach enabled complementary findings, high overlap in relevant studies, and mutual reinforcement between independent reviews. These outcomes highlight its potential as a valuable educational exercise that also contributes to the reliability of research synthesis in emerging domains.

Despite the promising results, the study was limited by the students' experience level, the use of a restricted number of databases, and the absence of detailed effort tracking. Moreover, only two of the nine literature reviews conducted were discussed herein due to space restrictions. However, the methodological rigor applied and the consistency between independently conducted reviews strengthen the validity of the approach and support its adoption in similar contexts.

The study of Family of Systematic Literature Reviews (F-SLR) still demand more investigation. Other families of reviews should also be carried out in industrial context or even with students in more advanced courses of undergraduate programs or even graduate programs.

As future work, several directions are envisioned. First, the replication of this F-SLR is planned with more mature researchers—such as graduate students or professionals—to analyze whether experience level affects coverage, synthesis quality, and convergence of results. Second, new F-SLRs will be conducted in different domains of Software Engineering and in industrial contexts, allowing for comparative analysis across topics and environments. Third, the use of Large Language Models (LLMs) will be further explored to automate or accelerate phases of data retrieval, screening, and synthesis, fostering reproducibility and efficiency in large-scale literature aggregation.

Ultimately, this study reinforces that the F-SLR paradigm has both pedagogical and methodological value: it not only enhances educational outcomes in research training but also represents a scalable and reliable strategy for evidence-based knowledge consolidation in Software Engineering.

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