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Quality and Use of Recording Fields in Home-Based Records Collected through a Missed Opportunities for Vaccination Assessment in Mozambique, 2017

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Abstract

Introduction: More than 163 countries use a form of home-based record which is a health document used to record the history of health services received by an individual. These records provide health workers with a standardized format to record receipt of these health services, such as vaccination history and enable them to make informed decisions about vaccine eligibility. However, implementation challenges, such as incorrect use of home-based records by health workers, persist and recent findings from a Missed Opportunities for Vaccination (MOV) assessment in Mozambique indicate poor vaccination recording practices as a challenge. **Methods:** This descriptive, secondary analysis of home-based record photos collected through a MOV assessment in Mozambique in 2017 aims to document the quality and use of selected recording fields in the home-based records. A data extraction form with 25 variables was generated in excel to capture information about the type of home-based record in the photo, the physical quality and availability and use of fields to record a child's vaccination history, growth monitoring, vitamin A for the child, deworming, and vitamin A for the mother. **Results:** Data from a total of 472 photos of home-based records were extracted and included in the analysis. The majority of home-based records (n = 440; 93.2%) were in good condition, and most children were <6 months of age (n = 215; 45.6%). More than half (n = 289; 61.9%) of the official home-based records from Mozambique (n = 467) were up-to-date versions. Except for eight (1.7%) home-based records that had blank vaccination recording fields, all other rec-

ords (n = 464; 98.3%) recorded information on the child's vaccination history, though suboptimal recording practices were observed. Other recording fields were less frequently filled in. **Conclusion:** The results indicate the common use of outdated home-based records, which were missing fields to record all vaccines a child was eligible for in 2017. Furthermore, suboptimal recording practices by health workers were observed, as well as a need to improve the record's design.

Keywords

Public Health, Home-Based Records, Missed Opportunities for Vaccination

1. Introduction

Worldwide, more than 163 countries use a form of home-based record [1], though there are many different types that exist across and sometimes within countries that vary in design, complexity and standardization of content elements [2]. Home-based record types include maternal home-based records, vaccination-only cards, expanded vaccination-plus cards, child health booklets, and more extensive maternal and child health handbooks [2]. What all these types of home-based records have in common is that they are documents used to record an individual's history of health interventions, and they are stored in the household by an individual or their caregiver. Ideally, home-based records are used to supplement health facility records [2]. The World Health Organization (WHO) recommends using home-based records for maternal, newborn, and child health to improve care-seeking behaviors, maternal and child self-care practices at home, men's involvement, infant and child feeding, and communication between caregivers and health workers [2]. For the expanded programme on immunization, home-based records are intended to provide health workers with a standardized page to record vaccination history that is easy to read, comprehensive, and enables them to make informed decisions about vaccinations [3]. These documents can also empower women, caregivers, and children about their vaccination status [4] and serve as reminders for individuals and caregivers about upcoming vaccination visits [3]. However, current evidence indicates diverse implementation issues related to home-based records, including stock-outs of home-based records, low retention among caregivers, incomplete and incorrect use by health workers, as well as suboptimal quality of records [2] [5]-[8].

In 1988, the WHO published a methodology guide for assessing Missed Opportunities for Vaccination (MOV), which was revised in 2015 [9]. A MOV refers to any encounter by a vaccine eligible child or individual, of any age, with a health service, yet they do not receive at least one of the vaccine doses for which they are eligible [9] [11]. Since 2015, several countries have completed MOV assessments using the revised MOV strategy, with documented results from Burkina Faso [12], Chad and Malawi [13], the Dominican Republic [14], Kenya [15], Mozambique

[16], Nigeria [17], and Timor Leste [18]. During MOV assessments, a mixed-methods approach is utilized, with field teams collecting quantitative data through health facility exit interviews with caregivers, and knowledge, attitude, and practices interviews with health workers. Qualitative data is collected through focus group discussions with caregivers and health workers, as well as through in-depth interviews with senior health administrators. As part of the MOV assessment, interviewers take photos of vaccination documentation, including home-based records or health facility registers, to validate a child's vaccination history [19].

Recently published findings from the MOV assessment in Mozambique recognized poor vaccination recording practices as a challenge that may have resulted in many children being undervaccinated or overvaccinated, which may lead to an overestimation or underestimation of the proportion of MOV [16]. This paper presents the results of a descriptive, secondary analysis of photos of home-based records that were collected during the MOV assessment in Mozambique in 2017 [16]. The objective is to document the physical quality of the home-based records and the use of select recording fields for the child's vaccination history, growth monitoring, vitamin A for the child, deworming, and vitamin A for the mother. The results of this analysis will contribute to the evidence-base on home-based records and can be used to inform decisions to improve the design, use, and quality of home-based records. Although the data was collected in 2017, the results remain relevant. Vaccination history is still recorded manually, and the same paper-based home-based record is in use in Mozambique.

2. Methods

2.1. Setting and Participants

In 2017, the Ministry of Health of Mozambique in collaboration with WHO and VillageReach carried out a MOV assessment. As part of this assessment, trained field teams conducted exit interviews with caregivers at 41 health facilities located in three provinces: Maputo, Niassa and Zambezia. Participants were eligible for inclusion in the MOV assessment if they were a caregiver (at least 18 years old) and attended a health facility with a child between 0-23 months of age in any of the districts on the day of the assessment. Between 13th to 27th November 2017, data were collected through WHO's standardized tools for MOV assessments, which were translated into Portuguese. Further details about the MOV assessment have been described elsewhere [16].

This secondary analysis includes photos of children's home-based records collected during the assessment in 2017. The photos were accessed on 14th February 2022.

2.2. Data Extraction and Analysis

An Excel spreadsheet (Excel version 16.64, 2022, Redmond, United States of America) was created to extract data about the type of home-based record, the quality, and the availability and use of selected recording fields, including the

child's vaccination history, growth monitoring, vitamin A for the child, deworming, and vitamin A for the mother. The data extraction sheet captured a total of 25 variables, including what type of document was shown in the photo, for example if it was an official home-based record from Mozambique. If the photo displayed a home-based record from Mozambique, it was assessed whether the version was the most recent or outdated. Home-based records were considered up-to-date if they included fields to record all vaccinations a child was eligible for in 2017. A document's physical state was coded as good or bad quality. Documents were considered bad quality when they were either torn, very dirty, had been visually exposed to liquids or were taped, indicating they had previously been damaged.

It was noted whether the home-based record had fields to record the child's vaccination history and whether data were recorded in them. It was also assessed whether recorded vaccine dates were complete, clear, if they were handwritten or stamped, and if individual dates were written for each antigen. Dates were coded as complete when they included a date, month, and year. After investigating if the home-based record included fields to record all vaccines a child was eligible for in 2017, the names of any missing vaccines were captured, whether these vaccines were manually recorded, and if they were entered in the designated recording space for other vaccines. Whether the home-based record had a stamp to indicate the child received all required vaccinations was also reviewed. Finally, the availability of fields for recording growth monitoring, vitamin A for the child, deworming, and vitamin A for the mother were noted, as well as whether information had been recorded. The final data extraction form is available in **Appendix 1**.

The data extraction form was created, using a template from a similar data extraction exercise. The form was adapted to align with the recording fields in Mozambique's home-based record, for example the inclusion of vitamin A for the mother.

NG extracted information from the first ten photos included in the analysis to test and refine the data extraction form. The results were verified with LN for quality assurance. Any disagreements were resolved through discussion. Subsequently, NG independently extracted information from all photos. Select photos were discussed with LN to verify the extracted information. Disagreements were again resolved through discussion.

Based on unique identification numbers, the dataset with the extracted information was linked to the information obtained through the exit interviews to review respondents and children's general characteristics. A descriptive analysis assessing quality and use of selected recording fields was performed in Stata (StataCorp. 2021. Stata Statistical Software: Release 17. College Station, TX: StataCorp LLC).

2.3. Ethical Considerations

The National Bioethics Committee in Mozambique (Comité Nacional de Bioética)

granted ethical clearance for the MOV assessment in 2017 (reference number: 1008). In addition, each province (Maputo, Niassa, and Zambezia) granted permission for the MOV assessment to be conducted. Before each interview, respondents were informed that participation was voluntary and optional. They were also informed that they could interrupt the interview if they wanted to and their responses would in no way affect their ability to access services or, in the case of health workers, threaten their employment. Participants gave verbal informed consent to participate in the study before taking part [16]. All collected data were stored anonymously.

3. Results

During the MOV assessment, 542 exit interviews with caregivers of children < 2 years of age were conducted. A total of 530 (97.8%) photos of home-based records were obtained; 10 (1.9%) children had no photos of home-based records, since the records were not available during the assessment, and photos of official registries were taken for two children (0.4%). After an initial review of the 530 photos, 58 (10.9%) photos were excluded from the analysis, as they did not fully show all vaccination recording fields (n = 40; 7.6%) or photos were duplicates (n = 18; 3.4%). In total, 472 (89.1%) home-based record photos were included in the analysis.

Among the 472 children, most were <6 months of age (n = 215; 45.6%) and almost all (n = 445; 94.3%) were accompanied by their mother. Children most frequently visited the health facilities for a healthy child visit or growth/development check-up (n = 183; 38.8%), for vaccination (n = 134; 28.4%) or to seek medical care (n=128; 27.1%). Table 1 presents general characteristics of children and the exit interview respondents.

Table 1. General characteristics of children and exit interview respondents, Mozambique 2017.

Child characteristics (n = 472)	n (%)
Age	
< 6 months	215 (45.6%)
6 – 11 months	145 (30.7%)
12 – 23 months	112 (23.7%)
Sex	
Male	235 (49.8%)
Female	237 (50.2%)
Reason for child visit	
Healthy child visit or growth/development check-up	183 (38.8%)

Continued

For vaccination	134 (28.4%)
For medical consultation (child is sick)	128 (27.1%)
Child is only accompanying (not for treatment, vaccination)	10 (2.1%)
Hospitalization (child was admitted or is still on admission)	3 (0.6%)
Other	14 (3%)
Respondent characteristics (n = 472)	n (%)
Respondent's relationship to the child	
Mother	445 (94.3%)
Father	19 (4%)
Uncle/Aunt	3 (0.6%)
Grandmother/Grandfather	2 (0.4%)
Missing	3 (0.6%)
Level of formal education	
No educational qualifications	188 (39.8%)
Did not complete primary education (less than 6 years)	95 (20.1%)
Completed primary education	134 (28.4%)
Completed secondary education	48 (10.2%)
Higher than secondary education	1 (0.2%)
Missing	6 (1.3%)
Occupation	
Domestic work	328 (69.5%)
Agriculture	108 (22.9%)
Employee	13 (2.8%)
Self-employed	9 (1.9%)
Teacher/professor	4 (0.9%)
Student	7 (1.5%)
Other	1 (0.2%)
Missing	2 (0.4%)
Provinces	
Maputo	138 (29.2%)
Niassa	163 (34.5%)
Zambezia	155 (32.8%)
Missing	16 (3.4%)

3.1. Types of Home-Based Records

The majority of children were in possession of the official home-based record from Mozambique called *Cartão de saúde da criança* (n = 465, 98.5%). Two children (0.4%) brought photocopies of the official home-based record to the facility,

five children possessed home-based records from other countries (four from South Africa (0.8%) and one from Malawi (0.2%)). More than half (n=289; 61.9%) of the home-based records from Mozambique available during the assessment (out of 467, including official ones and photocopies) were up-to-date versions, as they included recording fields for all vaccines children were eligible for in 2017, as shown in **Photo 1** and **Photo 3**. The other 178 (38.1%) home-based records were outdated versions and were missing fields to record vaccines for inactivated polio virus (IPV), the second dose of measles containing vaccine (MCV2), and rota virus (RV) (n = 150; 84.3%) or for recording IPV, MCV2, pneumococcal conjugate vaccine (PCV), and RV (n = 28; 15.7%) (**Figure 1**). A picture of an outdated home-based record is provided in **Photo 2**.

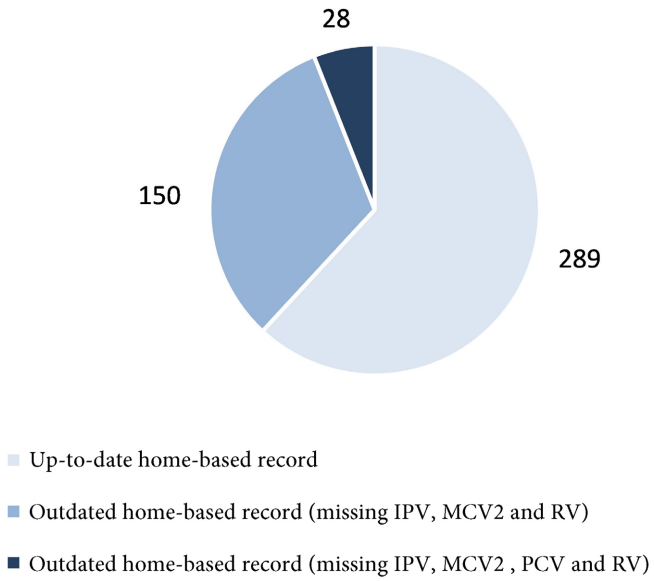

Figure 1. Count of different versions of home-based records in Mozambique, 2017 (n = 467).

Stratified by age groups, out of 215 children <6 months of age, 61 (28.4%) owned an outdated home-based record. Among children aged between 6 to 11 months (n = 145) and children 12 to 23 months old (n = 112), 58 (40%) and 59 (52.7%) possessed an outdated home-based record, respectively.

3.2. Quality of the Home-Based Records

Out of the 472 home-based records, the majority were in good condition at 93.2% (n = 440). Stratified by age groups, out of 215 home-based records that belonged to children <6 months of age, 212 (98.6%) were in good condition, compared to 135 (93.1%) and 93 (83%) of home-based records that were owned by children between 6 and 11 months old (n = 145) and 12 to 23 months of age (n = 112), respectively (**Figure 2**). **Photo 1** and **Photo 2** show examples of home-based records that were in good condition, compared to **Photo 3** which was considered poor quality.

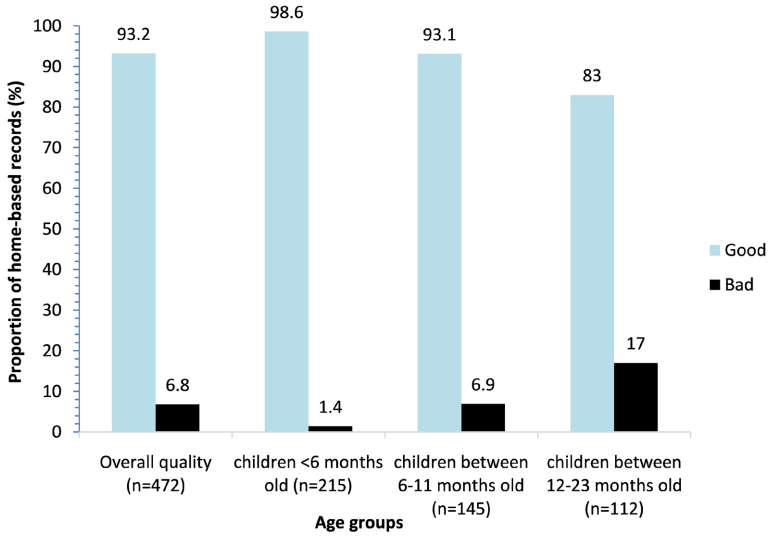

Figure 2. Home-based record quality for the entire sample and by age groups, Mozambique 2017 (%).

3.3. Use of Fields to Record Vaccination History in the Home-Based Record

Eight (1.7%) home-based records had blank vaccination recording fields, while all other records (n = 464; 98.3%) recorded handwritten information about the child's vaccination history. Of these 464 home-based records, two (0.4%) did not record dates, rather one (0.2%) recorded tick marks and the other one (0.2%) said *vaccination complete* across the vaccination recording fields.

Vaccination dates were incomplete in 133 (28.7%) home-based records. In more than half (n = 255; 55.2%) of the 462 home-based records that recorded vaccination dates, dates were recorded clearly, compared to around one third, where not all dates (n = 160; 34.6%) were clearly entered, and 47 (10.2%) where no dates were clearly entered. For two thirds of home-based records, dates of vaccination were written individually for each antigen (n = 294; 63.6 %), while for 47 (10.2%) dates were written across the fields, and 121 (26.2%) had a combination of both practices used. A small proportion (n = 13; 2.8%) of all 472 home-based records had a stamp to indicate the child had received all eligible vaccinations. All 13 of these were collected from Maputo province. Table 2 includes detailed information about the use of the vaccination recording fields.

Table 2. Use of the vaccination recording fields in home-based records, Mozambique 2017.

Use of the vaccination recording fields	n (%)
Field to record a child's vaccination history (n = 472)	
Yes	472 (100%)
Data recorded on field for vaccination (n = 472)	
Yes[1]	464 (98.3%)
No	8 (1.7%)

Continued

If data recorded on field for vaccination (n = 464)[1]: Are dates recorded completely?	
Yes	331 (71.3%)
No	133 (28.7%)
If vaccination dates recorded (n = 462)[2]: Are dates recorded clearly?	
Yes	255 (55.2%)
Not all	160 (34.6%)
No	47 (10.2%)
If vaccination dates recorded (n = 462)[2]: Are dates written individually for each antigen or across the vaccination recording fields?	
Individually for each antigen	294 (63.6 %)
Both	121 (26.2%)
Across the fields	47 (10.2%)
If vaccination dates recorded (n = 462)[2]: Are dates handwritten?	
Yes	462 (100%)
Stamp to indicate the child is fully vaccinated (n = 472)	
Yes	13 (2.8%)
No	459 (97.3%)
Fields to record all eligible vaccines (n = 472)	
Yes	294 (62.3%)
No	178 (37.7%)
If fields are not available for all eligible vaccines (n = 178), which ones are missing?	
Missing fields to record IPV, MCV2, RV	150 (84.3%)
Missing fields to record IPV, MCV2, PCV, RV	28 (15.7%)
If fields are not available for all eligible vaccines (n = 178), are the missing vaccines manually added to the vaccination recording fields?	
Yes	142 (79.8%)
No	36 (20.2%)
If missing vaccines are manually added (n = 142), are they recorded in the designated fields for other vaccines?	
Yes	26 (18.3%)
No	85 (59.9%)
Both[3]	31 (21.8%)

A practice that was observed on multiple home-based records was that dates were written in pencil, and not in pen, in the vaccination recording fields (**Photo 1**).

[1]One home-based record only recorded tick marks and another one said *vaccination complete* across the vaccination fields.
[2]The two home-based records mentioned in footnote 1 are not included.
[3]Recorded in the designated field for other vaccines and elsewhere in the vaccination recording fields.

3.4. Use of Other Health Intervention Recording Fields in the Home-Based Records

Compared to 98.3% of home-based records that recorded data on the child's vaccination history, other recording fields were less frequently filled in. Out of the 421 photos that showed the field for vitamin A for children, 210 fields (49.9%) had data recorded, including one that only had a tick mark, while the remaining 211 (50.1%) vitamin A fields were blank. Of the 363 photos that showed the deworming field, 273 (75.2%) had no information recorded. Three photos depicted growth monitoring charts, of which only one was filled in (33.3%) (Table 3).

Table 3. Use of recording fields for growth monitoring, vitamin A for the child, deworming, and vitamin A for the mother in home-based records, Mozambique 2017.

Use of other health intervention recording fields in the home-based records	n (%)
Field to record growth monitoring (n = 472)	
Yes	3 (0.6%)
Not visible on photo	469 (99.4%)
Data recorded on field for growth monitoring (n = 3)	
Yes	1 (33.3%)
No	2 (66.7%)
Field to record vitamin A for the child (n = 472)	
Yes	421 (89.2%)
Not visible on photo	51 (10.8%)
Data recorded on field for vitamin A for the child (n = 421)	
Yes[4]	210 (49.9%)
No	211 (50.1%)
Field to record deworming (n = 472)	
Yes	363 (76.9%)
Not visible on photo	109 (23.1%)
Data recorded on field for deworming (n = 363)	
Yes	90 (24.8%)
No	273 (75.2%)
Field to record vitamin A for the mother (n = 472)	
Yes	303 (64.2%)
Not visible on photo	164 (34.8%)
No[5]	5 (1.1%)

[4]One home-based record only recorded a tick mark without a date.

[5]The home-based records from Malawi and South Africa that were present in this sample do not have a field to record vitamin A for the mother.

Continued

Data recorded on field for vitamin A for the mother (n = 303)	
Yes	178 (58.8%)
No	125 (41.3%)

Photo 1. Example of the most up-to-date version of the home-based record from Mozambique of good quality.

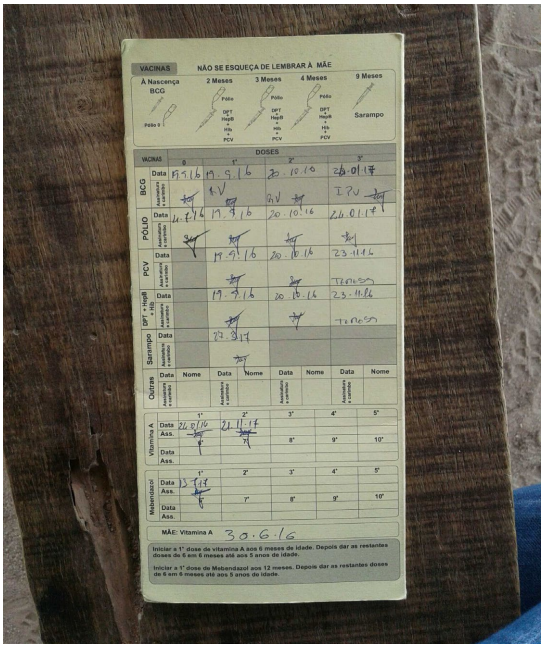

Photo 2. Example of an outdated version of the home-based record from Mozambique of good quality.

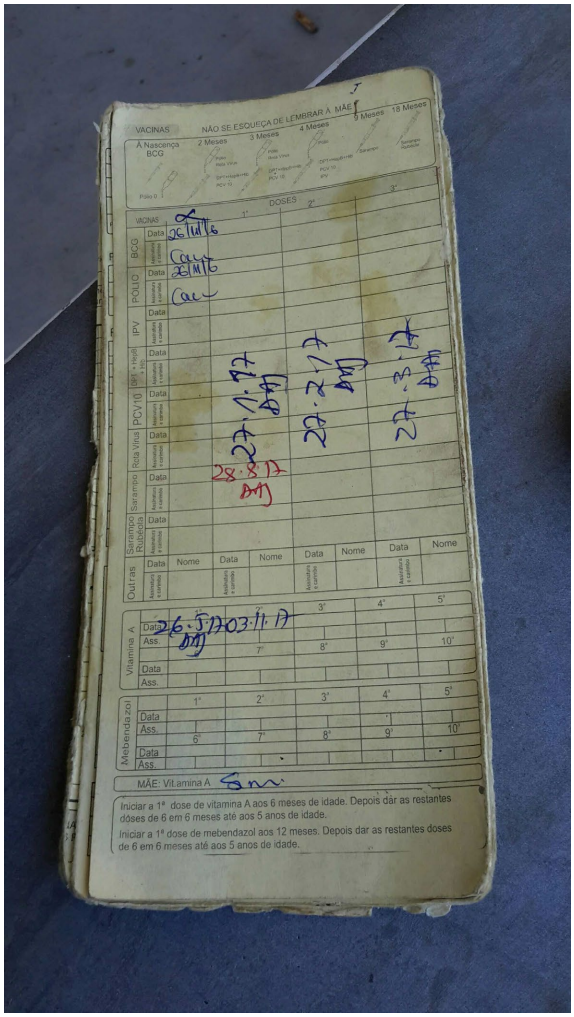

Photo 3. Example of the most up-to-date version of the home-based record from Mozambique of poor quality.

4. Discussion

Overall, this analysis found that most home-based records were in good condition and only a few were considered poor quality (6.8%). However, over 75% of children with home-based records on the day of the MOV assessment were under one year of age. Over time, these records can deteriorate quickly, if not properly maintained. This is why maintaining home-based records in good condition remains crucial and needs to be constantly reiterated by health workers to caregivers. Poor condition of home-based records can lead to challenges for health workers to verify a child's vaccination status and potentially lead to missed or delayed vaccinations, as well as overvaccination. In settings where facility registers or other reliable data recording tools are absent, deteriorated home-based records may pose a further challenge to the accurate assessment of vaccination coverage during surveys. Families may also experience difficulty proving the child's vaccination status, for example, for school entry requirements [20]. While the deployment of digital technologies to home-based records may help to overcome the issue of

poor-quality records, digitalization may lead to other challenges that need to be considered before transitioning to a hybrid or fully digital system, such as access and equity considerations, system readiness and infrastructure to digitize, and digital literacy [21].

Data on the vaccination history of a child was recorded in 98.3% of records, although suboptimal recording practices were observed, as vaccination dates were written incompletely or unclearly, which may lead to children being undervaccinated or overvaccinated since it is not clear what vaccines were administered. For example, the recent findings from a MOV assessment in Mozambique found 76% of children had a MOV, but this proportion is likely an overestimation or underestimation, due to the recording practices [16]. Data on vitamin A for the mother, vitamin A for the child, growth monitoring, and deworming were less frequently filled in at 58.8%, 49.9%, 33.3%, and 24.8%, respectively. However, the growth monitoring field was only visible in three photos, which strongly limits generalizability of results. It should also be noted that the lack of recordings of the other health interventions, i.e. vitamin A and deworming, does not differentiate whether these services were not received at all or if they were received but not recorded in the home-based record.

Findings of this analysis are consistent with a similar analysis of home-based records from a MOV assessment in Kenya in 2016 where the child's vaccination history and background information were most frequently filled in, compared with other fields for other health interventions [22]. Previous research from South Africa that investigated the completeness (based on the indicators infant birth weight, BCG vaccination, maternal syphilis results, maternal HIV status) of the Infant Road to Health Booklet found that less than 50% of home-based records were completely filled in between 2011 and 2013, and BCG immunization was recorded more frequently than the other health interventions [23].

One implication that unused recording fields may have is that they can give the impression to caregivers that the particular health interventions are not as important and thus no data is entered. For health programmes, blank recording fields are likely to have cost implications, as home-based records can be expensive to print and distribute. It might be beneficial to review and potentially remove unused content, to talk to health workers and learn why recording fields are not filled in, and to increase efforts that ensure these fields are used correctly. WHO recently published a practical guide to strengthen implementation of home-based records for maternal, newborn, and child health in response to the existing implementation challenges. The guide includes activities and decision-making tools for country programme managers to enhance processes across planning, selection of content to include in a home-based record, design, implementation and monitoring of home-based records [24].

This sample included 178 outdated home-based records from Mozambique, which indicates there may have been a high number of outdated home-based records left at certain facilities that were not distributed in previous years or there

may have been insufficient quantities of up-to-date home-based records available at the time of distribution to caregivers. The lack of space for all eligible vaccines leads health workers to record the vaccinations elsewhere, which ideally should be filled in the designated space to record other vaccines. However, these designated fields were often unused, and instead information was entered in any vaccination recording field. This may inhibit the ability to clearly read the recorded information, especially if dates are written illegibly. Varying recording fields across home-based records may also increase recording errors by health personnel [25], especially if the caregiver moves to another area. Furthermore, in many of the home-based records with fields for all eligible vaccines, not all unnecessary vaccination recording fields were coloured in dark grey, which is usually used to indicate no information needs to be recorded in that particular field. In this sample, it was observed that vaccines were sometimes recorded in these unnecessary recording fields which might lead to undervaccination or overvaccination. For example, in some up-to-date home-based records three IPV vaccination recording fields were not coloured in grey and information was recorded in more than one field, which indicates a child may have received multiple IPV doses. For future design iterations of the home-based record, expanding the recording space for additional or newly introduced vaccines and clearly marking fields that should not be filled in could enhance usability and clarity of the card.

It is likely that the dates written in pencil in the vaccination recording fields are return dates for the child's next vaccination visit, as there was no designated field to record the next vaccination date in the home-based record. Occasionally, the date written in pencil was overwritten by the actual date the child received the vaccine without erasing the date written in pencil. Unless clearly explained to the caregiver, they could assume the child had received all necessary vaccines. In addition, if a survey was to be conducted, this could lead data collectors to assume the vaccine had been received. In future versions of the home-based record, it could be useful to add a designated field for return dates that is easy to locate for caregivers and health workers.

The presence of home-based records from Malawi and South Africa in the sample indicates there is cross-border movement between Mozambique and these countries. It also suggests caregivers have retained the cards for their children and continue to bring them to health facilities outside of the countries they were issued in. Likewise, it can be positively noted that health workers seem to fill in these home-based records to maintain continuity, instead of issuing new ones.

Strengths and Limitations

This analysis adds to the existing evidence base on home-based records and may help to inform strategies to improve the design, use, and quality of home-based records. It benefits from a large sample size of 472 home-based records from three different provinces. However, a few limitations need to be noted. The included photos are derived from a health facility-based, convenience sample of caregivers

and therefore, the results cannot be generalized for the population of Mozambique. Secondly, the sample was reviewed, and the data extracted by one reviewer. The quality of home-based records was based on criteria mentioned above, nonetheless, this was a subjective assessment by the first reviewer and may have led to misclassification and therefore an underestimation or overestimation of the number of good and bad quality home-based records. Select photos were discussed with a second reviewer to address this limitation.

5. Conclusion

The majority of home-based records collected through the 2017 MOV assessment in Mozambique were in good condition. However, almost three-quarters of the children were under one year of age. Even though almost all home-based records recorded information on the child's vaccination history, improvements in recording practices are needed to be able to validate a child's vaccination history. The findings also highlight the common use of outdated home-based records, which were missing fields to record all vaccines a child was eligible for in 2017. Fields to record growth monitoring, vitamin A for the child, deworming, and vitamin A for the mother were less frequently filled in. Incomplete records of health interventions an individual received may impact the home-based record's potential and influence what interventions an individual will receive during subsequent health encounters. Future research could examine the accuracy of recorded information in the home-based record, for example by comparing it to data captured in facility registers. Furthermore, the physical quality and utilization of comprehensive home-based records could be investigated, as well as whether the format, content, and design of the home-based record is associated with improved quality, use and retention. Future studies could also explore other factors that influence quality and use of home-based records, such as health workers' capacity and caregivers' perceptions of the record.

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Conflict of Interest

The authors declare that they have no conflict of interests.

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Appendix 1

Variables	Answer Choices
Good quality photo	Yes/ No
Photo taken	Yes/ No
Number of photos taken	1/2/3
Type of document	Official home-based record/ Notebook/ Official registry/ Photocopy of official home-based record/ Home-based record from a different country
Document state (Quality)	Good/ Bad
Is the home-based record outdated	Yes/ No
Field for immunization data	Yes/ No
Data on immunization recorded	Yes/ No
Dates complete	Yes/ No
Dates clear	Yes/ No/ Not all
Dates written, stamped, marked	Written/ Stamped/ Marked
Stamp on the record	Yes/ No
Individual dates written/stamped across fields	Individual/ Across/ Both
Field for all eligible vaccines	Yes/ No
If not, which fields are missing	Open ended
Vaccines with missing fields manually added	Yes/ No
Were they added in designated field for other vaccines	Yes/ No
Field for growth monitoring/measurements	Yes/ No
Data on growth monitoring recorded	Yes/ No/ NA
Field for vitamin A for the mother	Yes/ No
Data on vitamin A for the mother recorded	Yes/ No/ NA
Field for vitamin A for the child	Yes/ No
Data on vitamin A for the child recorded	Yes/ No/ NA
Field for deworming	Yes/ No
Data on deworming recorded	Yes/ No/ NA