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Investigating Machine Translation Post-Editing Outcomes in Expert-Based Closed Crowdsourcing: Evidence from a Qualitative Study

Marziyeh khalilizadeh Ganjalikhani

Assistant Professor, Foreign Languages Department, Faculty of Tourism, Higher Education Complex of Bam, Bam, Kerman, Iran, Email: marziyehkhalilizadeh@gmail.com

Abstract

Post-editing refers to activities aimed at improving machine translation (MT) output to achieve human-level quality. Crowdsourcing translation post-editing (CTPE) can provide a cost-effective approach, yet open crowdsourcing models often suffer from inconsistent quality due to varying levels of participant expertise. This study examines a closed, expert-driven crowdsourcing model for Persian health translations, using a qualitative approach to analyze post-editing practices within a Telegram-based expert community. Thirty qualified translators performed post-editing on machine-generated translations of health-related texts, with three independent expert proofreaders evaluating multiple candidate outputs for each instance. Problematic instances were identified and assessed according to linguistic criteria adapted from the Patient-Oriented and Culturally Appropriate (POCA) health translation framework, focusing on clarity, coherence, lexical appropriateness, and readability. The findings indicate that this closed model facilitates careful, context-sensitive post-editing, produces multiple acceptable solutions for each instance, and may tentatively reduce the need for extensive proofreading. These results underscore the potential of structured, expert-driven CTPE to support translation quality in specialized domains while highlighting the interpretive complexity inherent in post-editing tasks.

Keywords: Closed Crowdsourcing, Expert-driven Crowdsourcing, Machine Translation, Post-editing, Translation Quality

1. Introduction

Post-editing (PE) in translation involves refining machine-generated output to achieve human-level quality, ensuring accuracy, clarity, and coherence. As machine translation (MT) has become increasingly embedded in translation workflows, PE has attracted significant attention in both research and professional practice (Yang et al., 2023). The quality of post-edited output is highly context-dependent, varying according to factors such as the intended audience, distribution channel, and anticipated reuse of the translation (Hu & Cadwell, 2016; Nitzke & Hansen-Schirra, 2021). O'Brien (2011) emphasizes that PE should be conducted by human translators rather than laypersons who are merely proficient in the source and target languages or only in the target language.

To address the challenges of translating large volumes of content efficiently, crowdsourcing translation (CT) has emerged as a widely used approach. In CT, translation tasks are distributed to a pool of contributors, often via online platforms, allowing multiple participants to work on small units of text simultaneously (Anastasiou & Gupta, 2011; Jiménez-Crespo, 2017). This approach accelerates translation workflows while providing flexibility in managing a distributed workforce. Crowdsourced translation post-editing (CTPE) combines the efficiency of CT with the precision of human post-editing, enabling the timely refinement of machine-generated translations while maintaining quality control.

The success of CTPE depends on the crowdsourcing model employed. Open models, which allow unrestricted participation, often yield variable quality due to differing levels of expertise and familiarity with specialized content. Closed models, by contrast, restrict participation to vetted contributors based on professional qualifications or experience, enabling greater consistency and quality control while retaining efficiency and scalability (Jiménez-Crespo, 2017; Kelly et al., 2021). Closed, expert-driven communities are particularly suited to high-stakes domains such as healthcare, where accuracy and specialized knowledge are critical. These communities support structured collaboration, clear guidelines, and quality monitoring, with leadership and task management promoting participant engagement and reliable output (Haythornthwaite, 2009; Jones, 2019; Nielsen, 2006).

Despite the increasing use of CTPE, research examining closed, expert-driven crowdsourcing remains limited, particularly in Persian health translation. Most prior studies have focused on open participation or non-specialist contributors, leaving questions about how controlled, expert-only communities affect post-editing quality and workflow efficiency. This study therefore explores the benefits of closed crowdsourcing groups and the challenges of community management and quality assurance, providing new insights into optimizing post-editing workflows in specialized domains.

1.1. The Concept of Crowdsourcing Translation Post-editing (CTPE)

Crowdsourced Translation (CT) refers to the distribution of translation tasks among a group of contributors, often coordinated through online platforms, rather than relying on a single professional translator (Anastasiou & Gupta, 2011). This model has gained prominence as translation service providers seek scalable and cost-efficient alternatives to traditional workflows. A defining feature of CT is task segmentation: source texts are divided into smaller units, enabling parallel work by multiple contributors. As Jiménez-Crespo (2017) observes, such fragmentation not only accelerates production but also increases participant engagement, particularly for lengthy or repetitive texts. These characteristics make CT especially compatible with post-editing workflows, in which short, self-contained segments allow contributors to focus on accuracy and clarity when refining machine-generated output.

The integration of crowdsourcing with machine translation (MT) dates back to the late 1990s and early 2000s, when post-edited human corrections were increasingly used to improve MT systems and training data (Aikawa et al., 2012; Shimohata et al., 2001). While these early studies reflect earlier generations of MT technology, they established foundational principles that remain relevant: human intervention is essential for correcting systematic MT errors, and distributed post-editing can be leveraged to handle large volumes of translated content efficiently. Contemporary CTPE builds on these principles within more advanced MT environments, shifting the focus from system training toward quality assurance and the usability of translated outputs. Subsequent research has demonstrated the applicability of CTPE across various domains, including healthcare (Dew et al., 2015; Laurenzi et al., 2013; Soares et al., 2020), website localization (Aikawa et al., 2012), and online communication platforms (Chen et al., 2017; Han et al., 2017). Across these contexts, a recurring finding is that contributors' subject-matter familiarity, rather than formal translation credentials alone, can substantially improve the adequacy and acceptability of specialized translations. This insight is particularly relevant to health-related content, for which conceptual understanding and terminological accuracy are critical.

Research comparing human translation (HT), machine translation (MT), and post-edited outputs further underscores the value of CTPE. Soares et al. (2020) report that post-edited translations were frequently accepted as final versions due to their improved quality. Yan et al. (2014) propose a collaborative model in which multiple nonprofessional translations are iteratively refined by editors, yielding results comparable to professional standards. Similarly, Laurenzi et al. (2013) emphasize systematic post-editing as a means of enhancing previously translated materials. Taken together, these studies suggest that CTPE can function as a practical and cost-effective mechanism for improving translation quality, particularly when contributor selection and workflow design are carefully controlled. Building on this body of work, the present study adopts a closed, expert-driven CTPE model in which post-editing tasks are performed

independently by qualified contributors. Rather than emphasizing open participation, the study focuses on how controlled task design, expert selection, and structured evaluation can support reliable post-editing outcomes in a high-stakes domain. This design choice directly reflects insights from prior CTPE research while addressing the need for greater empirical attention to expert-only, closed crowdsourcing configurations.

1.2. Open Models vs. Closed Models in Crowdsourcing Translations

CT models can be categorized into open and closed systems, each with distinct characteristics, advantages, and challenges. Open models allow broad participation with minimal barriers to entry. Platforms such as Facebook and Twitter exemplify this approach. For instance, Facebook requires users to engage with the platform for a short period before participating in its translation initiative, ensuring some familiarity (Mesipuu, 2012), whereas Twitter enables immediate participation without prior restrictions. Such systems can be effective when the primary objective is to maximize participation and output volume. However, because contributors often differ in expertise and motivation, translation quality may vary considerably.

In contrast, closed models restrict participation to selected contributors based on specific criteria, such as professional qualifications or translation tests (Kelly et al., 2021). For example, Translators Without Borders requires volunteers to have a minimum of four years of professional experience to help maintain translation quality (Jiménez-Crespo, 2017), while organizations such as Kiva and Watching America employ rigorous admission procedures to encourage commitment and reliability. Research further supports the importance of participant expertise in post-editing contexts. Moorkens and Doherty (2013) argue that MT post-editing is an unnatural activity requiring training and adherence to guidelines, while Yamada (2015) demonstrates that positive participant attitudes are associated with stronger task performance. Closed models are therefore particularly suitable for post-editing tasks, in which structured collaboration and role differentiation can support quality assurance. As noted by Camara (2015), such environments often include revisers and managers who oversee the editing process, while feedback mechanisms contribute to continuous improvement and participant engagement (O'Brien & Schäler, 2010). These organizational structures also facilitate project management and the protection of sensitive content in initiatives such as GetLocalization and OneHourTranslation (Zaidan & Callison-Burch, 2011).

1.3. Community Management in Crowdsourcing Translation

Managing expert-driven communities is critical to the success of CT projects, particularly within closed models. In the online collaboration literature, communities are often classified as “lightweight” or “heavyweight” based on their structure and interconnectedness (Haythornthwaite, 2009; Mesipuu, 2012). Lightweight communities, which are common in open CT systems, feature loose connections, minimal hierarchical structures, and often anonymity among participants.

Although these characteristics facilitate broad participation and rapid scaling, they may limit accountability, coordination, and consistency. In contrast, heavyweight communities, which are more typical of closed models, are characterized by visible identities, structured roles, and high interconnectivity. These features promote collaboration, knowledge sharing, and peer accountability while enabling leaders to coordinate tasks, enforce standards, monitor quality, and support participant specialization in roles such as post-editing, reviewing, and quality monitoring. The resulting interdependence among contributors helps establish and maintain shared expectations regarding quality and performance.

Leadership, gatekeeping, and participant engagement further contribute to the effectiveness of heavyweight communities. Leaders provide oversight and implement entry requirements to ensure that contributors meet minimum expertise criteria (Jones, 2019). For example, Wang et al. (2017) describe a closed subtitling community in which probationary periods and introductory processes preceded full participation. Such mechanisms help reduce variability in contributions and support adherence to project standards. Participation and motivation are also important considerations, particularly in light of Nielsen's (2006) 90-9-1 rule, which suggests that only a small proportion of users contribute actively. Closed communities may address this challenge through structured feedback, recognition, and opportunities for skill development (Mesipuu, 2012; O'Brien & Schäler, 2010). Combined with peer evaluation, performance tracking, and structured review procedures (Zaidan & Callison-Burch, 2011), these practices can foster sustained engagement and support consistent translation quality, as demonstrated in initiatives such as *The Economist's* volunteer Chinese translation project (Ray & Kelly, 2011).

1.4. Challenges and Research Gaps in Closed Crowdsourcing Post-Editing

Professional translators, with their extensive training and experience, are widely recognized for producing high-quality translations, although their services are costly (Hu et al., 2014). While the previous sections have outlined the potential benefits of expert participation and controlled collaboration, empirical research on closed, expert-driven CTPE remains limited, particularly in specialized domains such as health translation and in Persian-language contexts (Guazzini et al., 2015). This context is especially important because health-related texts require a high degree of accuracy, clarity, and terminological consistency, as translation errors may affect readers' understanding of critical information. Furthermore, the growing availability of machine-translated health content has increased the need for reliable post-editing approaches that can ensure both linguistic quality and domain-specific accuracy. Questions remain regarding workflow organization, participant adherence to guidelines, quality monitoring, and the practical implementation of closed collaborative environments. This study addresses these gaps by examining a closed, expert-driven community performing post-editing tasks via Telegram, which was chosen primarily because the contributors were already organized in an Iranian translation studies Telegram channel and no other closed platforms were accessible. Drawing inspiration

from Silva and Lopes (2016), the study adopts structured workflows and oversight mechanisms to investigate how expert collaboration operates in practice and how it may contribute to post-editing processes in a specialized translation setting. Overall, the study aims to provide empirical and conceptual insights into the implementation of closed crowdsourced post-editing and its potential strengths and challenges.

1.5. Research Question

In what ways do closed, expert-driven crowdsourcing groups shape post-editing processes and the resulting quality of health-related Persian translations?

2. Method

In the methodology section, the following aspects are detailed: participants, materials, procedures, instruments, and data collection. Each is explained below:

2.1. Research Design

This study employed a descriptive-analytic qualitative research design to examine expert post-editing behavior and quality-oriented decision-making within a closed crowdsourcing environment. A qualitative approach was considered appropriate because translation quality, particularly in health-related contexts, involves context-sensitive, interpretive judgments that cannot be fully captured through quantitative metrics. The study therefore focused on identifying, describing, and analytically interpreting expert interventions applied to machine-translated health texts.

To guide the analysis, the study used the Patient-Oriented and Culturally Appropriate (POCA) health translation model (Lin & Ji, 2019) as an analytical framework for identifying problematic instances. POCA is specifically designed for health translation contexts, in which clarity, accuracy, and audience comprehension are critical. Its focus on patient-centered communication, linguistic clarity, cultural accessibility, and informational practicality makes it particularly suitable for evaluating health-related machine-translated content. The study focused on the Linguistic Comprehensibility dimension, which encompasses six aspects of linguistic quality: the accurate translation of health conditions and medical terminology; the use of concrete and familiar expressions rather than abstract language; coherence and logical organization; the use of simplified terms to explain complex health concepts; the use of positive and qualitative language; and the preference for simple sentence structures over complex embedded constructions. These categories were applied as predefined criteria for identifying problematic machine-translated instances and guided both the identification of problematic segments and the analysis of expert post-editing decisions, ensuring consistency across the dataset.

2.2. Materials

This study focused on health-related texts due to the high communicative stakes associated with this domain and the need for clarity and accuracy in translated health information. In translation studies, health texts are often considered sensitive because misunderstandings or ambiguities may directly affect users' comprehension, decision-making, and well-being. For this reason, ensuring readability, defined as clarity, explicitness, and ease of understanding, is a central concern when translating health-related materials.

Persian was selected as the target language because empirical research on crowdsourced translation post-editing (CTPE) for Persian health texts remains limited in the existing literature. Although MT tools are widely available for Persian, the systematic investigation of post-editing practices and quality-oriented workflows for this language, particularly in health-related contexts, remains underexplored. This gap highlights the need for focused qualitative research examining how post-editing processes can support translation quality in Persian health communication.

The corpus was drawn from the Health Translations website, an Australian government initiative that provides multilingual health information to the public. This resource was selected for two main reasons. First, it offers a large and diverse repository of professionally produced health-related texts, with over 830 translated documents covering a wide range of medical and healthcare topics. Second, the website's advanced search and filtering features enabled the targeted and systematic selection of relevant materials, facilitating controlled corpus compilation for the purposes of this study.

2.3. Population and Sampling

The study employed a two-stage sampling approach. First, the total corpus of 835 translated documents across 89 health-related topics was reviewed. Because some topics contained more than 30 documents, whereas others contained only one, purposive sampling was used to ensure broad topical coverage. One document was selected from each topic, resulting in a final sample of 89 documents.

The machine-translated output of these 89 documents was then examined using the Patient-Oriented and Culturally Appropriate (POCA) health translation model (Lin & Ji, 2019), focusing on the six categories of the Linguistic Comprehensibility dimension. This review identified 456 problematic instances in which the translations exhibited deficiencies in clarity, coherence, word choice, sentence structure, tone, or accuracy, rendering them unsuitable for direct use without expert post-editing.

From these 456 instances, 15 were selected for crowdsourced post-editing. This smaller set was designed as a microtask to maintain participant engagement while supporting high-quality contributions. Previous research suggests that excessively long tasks may lead to fatigue, lower response rates, and reduced output quality; therefore, selecting 15 instances provided a balance

among feasibility, response quality, and representativeness (Jiménez-Crespo, 2016; Mao et al., 2013; Zhang et al., 2018).

To strengthen rigor, the 15 instances were selected using a combination of purposive sampling and limited randomization. First, purposive sampling was used to ensure the representation of all six POCA linguistic categories. The final sample included two instances related to the accurate translation of health conditions and medical terminology, four involving the use of concrete and familiar expressions, three concerning coherence and logical structure, and two instances from each of the remaining categories: simplified health concepts, positive and qualitative language, and simple sentence structures. Categories containing larger numbers of problematic instances in the corpus, particularly concrete and familiar expressions (203 instances) and coherence and logical structure (109 instances), were represented by a greater number of selected examples. After determining the number of instances to be selected from each category, the specific examples were chosen randomly from the pool of problematic instances within that category to reduce potential researcher selection bias.

2.4. Participants

The study engaged two distinct participant groups: crowdsourced post-editors and expert proofreaders. The post-editors were recruited from a closed crowdsourcing community within the Iranian Translation Studies Telegram channel. Established in October 2015, the community includes undergraduate, graduate, and postgraduate Translation Studies students, researchers, and professional translators. Prospective members were required to submit academic or professional credentials, which were verified by the channel administrator before access was granted. This procedure ensured that participants possessed relevant expertise and helped maintain the integrity of the closed group. From this qualified pool, 30 members contributed to the post-editing process during the 48-hour task period. Regarding educational background, 12 participants (40%) held a bachelor's degree, 8 (26.7%) held a master's degree, and 10 (33.3%) held a PhD in Translation Studies or related fields. Overall, the group reflected a relatively high level of academic specialization, with more than half of the participants holding postgraduate qualifications.

To enhance objectivity during evaluation, three expert proofreaders were recruited. All held PhDs in Translation Studies and served as assistant professors at reputable universities. Their role was to select the most appropriate post-edited versions and ensure consistency throughout the evaluation process.

2.5. Instruments

NVivo 12 software (QSR International) was used to organize and code the data systematically. Coding followed the six categories of the Linguistic Comprehensibility dimension of the POCA model (Lin & Ji, 2019):

- Accurate translation of health conditions and medical terminology: 15 references
- Avoid abstract translation; use concrete and familiar expressions: 203 references
- Increase coherence and logical structure: 109 references
- Use of simplified terms to illustrate complex health concepts: 17 references
- Use positive expressions and qualitative language: 17 references
- Use simple sentence structures and avoid complex embedded phrases: 95 references

These coding references represent instances where machine-translated texts failed to meet POCA quality criteria. NVivo facilitated categorization, comparison, and identification of recurring patterns in post-editing strategies across participants, supporting a structured and reproducible qualitative analysis.

Telegram was used as the primary platform for conducting the crowdsourced post-editing tasks because the Iranian Translation Studies community was based on a Telegram channel. Beyond serving as a communication tool, Telegram actively mediated the post-editing process by enabling real-time discussion, task coordination, and collaborative decision-making. Features such as group chats, automated notifications, and integration with simple bots allowed for the efficient management of participant contributions, transparent tracking of edits, and enhanced engagement.

2.6. Procedures

This study followed a structured yet flexible procedure designed to support the qualitative analysis of expert post-editing behavior within a closed crowdsourcing environment.

First, 89 health-related documents were selected from the Health Translations website and translated into Persian using Google Translate. The machine-translated outputs were systematically reviewed, and problematic expressions requiring post-editing were identified based on the predefined linguistic criteria outlined earlier in the study. From this pool, 15 representative problematic instances were selected and distributed as microtasks to a closed group of expert translators via Telegram. Participants were given 48 hours to complete the task and were guided by three principles: avoiding unnecessary over-editing, disregarding purely stylistic variations, and providing a fresh translation when the machine output was unusable. This design encouraged focused, quality-oriented revisions while maintaining participant engagement.

Following data collection, the researcher screened the submissions to remove duplicate or near-identical versions in order to reduce redundancy and facilitate manageable comparisons across outputs. Five distinct post-edited versions per instance were then retained for expert

evaluation. In the final stage, three expert proofreaders independently reviewed the retained post-edited versions without consulting one another. Each proofreader could select more than one acceptable option per instance, recognizing that multiple revisions might satisfy the translation quality criteria. These procedures were designed to capture how closed, expert-driven groups influence post-editing processes and outcomes, directly aligning with the study's research question.

3. Results

A total of 89 health-related documents were selected for analysis. The machine-translated output was carefully examined, and 456 problematic instances were identified. For coding purposes, these instances were grouped into four subcategories: Disease, Social Problems and Services, Natural Problems and Therapies, and Medicines Sets. While the study did not focus on the types of problematic instances, it concentrated on the quality and improvement of the post-edited versions.

Fifteen problematic instances were shared with the closed group of expert crowdsourcers for post-editing. Given the large volume of post-edited outputs (30 contributions per instance), it was not feasible to display all versions. Instead, six instances were selected to illustrate the diversity of post-editing strategies and improvements, each with five representative post-edited versions chosen after overly similar or redundant entries had been removed. These instances reflect a variety of translation challenges and showcase the nuanced decisions made by expert contributors.

Table 1
Representative Post-Edited Instances

No.	Original Version	Google Translate Version	Post-edited Version 1	Post-edited Version 2	Post-edited Version 3	Post-edited Version 4	Post-edited Version 5
	Agoraphobia is not a specific disorder	آگورافوبیا یک اختلال خاص نیست.	برزن هراسی یعنی ترس از حضور در مکان های باز (آگورافوبی) یک اختلال خاص و مشخص نیست.	آگورافوبی را نمی توان اختلال در نظر گرفت.	ترس از حضور در مکان های باز (آگورافوبی) یک اختلال خاص نیست.	آگورافوبیا یا ترس از حضور در مکانهای باز، یک اختلال مشخص نیست.	نمی توان ترس از فضای باز را اختلال خاصی در نظر گرفت.
	Your GP is usually your main provider of health care.	پزشک عمومی شما معمولاً ارائه دهنده اصلی مراقبت های بهداشتی شما است.	معمولاً پزشک عمومی شما اصلی ترین فرد در رابطه با سلامت و بهداشت شماست.	پزشک عمومی (خانوادگی) شما، معمولاً مهمترین فرد در ارائه خدمات سلامت و بهداشت به شما است.	معمولاً پزشک عمومی مهم ترین فردی است که خدمات سلامت و بهداشت شما را فراهم می کند.	پزشک خانواده عمدتاً مسئول اصلی ارائه خدمات سلامتی می باشد.	معمولاً دکتر عمومی اصلی ترین خدمات سلامتی را برای شما فراهم می کند.
	Give them more frequent	به آنها شیرهای مکرر بدهید.	مکرراً به آنها شیر مادر بدهید.	این نوزادان باید به میزان بیشتری از شیر مادر تغذیه	تغذیه با شیر مادر به دفعات نیاز است.	این نوزادان باید بیشتر از معمول، شیر مادر	به آنها به دفعات بیشتر شیر مادر بدهید.

breastfeed.	کنند.	بخورند.
Acknowledging that all palliative caring situations are unique	میدانیم که تمامی شرایط پرستاری منحصر به فرد هستند.	باید بدانیم هر بیماری‌ای که نیاز به مراقبت تسکینی دارد، در نوع خود منحصر به فرد است.
You can verbally model words or phrases for your child to use	شما می‌توانید به صورت شفاهی از کلمات یا عباراتی را برای استفاده فرزندتان مدل کنید.	شما می‌توانید در صحبت‌های خود از کلمات و جملاتی استفاده کنید که کودکان بتوانند از آنها الگو گرفته و تقلید کنند.
Showing your child the object you are talking about can help them to understand that they have names	نشان دادن شی‌ای که درباره آن صحبت می‌کنید می‌تواند در درک اینکه هر چیزی اسمی دارد به کودکان کمک کند.	نشان دادن شی‌ای که در مورد آن صحبت می‌کنید به کودک کمک می‌کند تا متوجه شود اشیاء اسم دارند.

Note. Six representative instances are shown here;

Proofreaders were allowed to select multiple post-edited options per instance to reflect the interpretive nature of translation. Table 2 summarizes their selections for the 15 problematic instances. The final post-edited version was determined by identifying options unanimously selected by all proofreaders. If multiple options met this criterion, the final version was randomly chosen from among them.

Table 2

Proofreader Selection of Post-Edited Versions

Option No.	Proofreader 1	Proofreader 2	Proofreader 3
1	5	4	5
2	4	4	4
3	4	3	5
4	3	3	3
5	4	4	4
6	4	3	4
7	1	2	2
8	3	2	3
9	4	3	3
10	3	3	4
11	5	5	5
12	3	2	4
13	5	5	5
14	4	4	4
15	3	2	2

To provide an overview of proofreader selection patterns, Table 3 presents descriptive statistics for the number of post-edited options selected by each proofreader.

Table 3

Descriptive Statistics of Proofreader Selections

	N	Minimum	Maximum	Mean	Std. Deviation
Proofreader1	15	1.00	5.00	3.6667	1.04654
Proofreader2	15	2.00	5.00	3.2667	1.03280
Proofreader3	15	2.00	5.00	3.8000	1.01419
Valid N (listwise)	15				

Note: These descriptive statistics summarize patterns in proofreader selections; they are presented to provide context for decision-making and are discussed further in the Discussion section in terms of quality and interpretive richness.

The multiple-selection patterns demonstrate that expert proofreaders identified several plausible revisions for each instance, reflecting the complexity and nuance of translation tasks. The diversity of post-edited versions illustrates improvements in clarity, coherence, and lexical appropriateness compared with the MT output. These patterns also support the discussion in Section 4, in which the concept of “quality” in post-editing is analyzed. The combination of the qualitative inspection of representative instances and the descriptive statistics of proofreader selections provides meaningful insights into proofreaders’ evaluation patterns and the interpretive richness of the closed, expert-driven crowdsourcing approach. The descriptive statistics are presented to summarize selection tendencies across proofreaders rather than to establish statistical reliability. Although primarily descriptive, the results indicate that even a small, highly skilled group can produce high-quality translations. However, because expert proofreaders were involved throughout the evaluation process, the findings do not permit firm conclusions regarding the extent to which proofreading requirements might be reduced or streamlined.

4. Discussion

This study examined post-editing practices within a closed, expert-driven crowdsourcing environment, with particular attention to participant expertise, decision-making patterns, and the implications of limited but qualified participation. Rather than claiming definitive effectiveness, the discussion interprets the findings within the methodological and contextual boundaries of the study.

Most crowdsourced translation studies rely on open participation by volunteers who typically lack professional training and are compensated minimally or not at all (Jiménez-Crespo, 2017). This is also the case in many crowdsourced translation post-editing (CTPE) studies, in which participants generally have varying levels of bilingual proficiency but no formal translation expertise. For example, previous studies (Aikawa et al., 2012; Dew et al., 2015; Soares et al., 2020) involved volunteers with some subject-matter knowledge but no formal post-editing or translation training. Similarly, Chen et al. (2017) engaged “novice contributors” without formal training in

translation or post-editing. In contrast, the approach adopted in the present study ensured that contributions were informed by a deep understanding of linguistic nuances and contextual difficulties, distinguishing it from studies relying on broader, less specialized participant pools.

Of approximately 5,000 members in the Telegram channel, only 856 saw the task announcement during the 48-hour CTPE process. It is possible that those who chose to participate had a particular interest in or familiarity with health-related content. However, this remains speculative and cannot be confirmed. The final group of 30 crowdsourcers therefore represents the subset of members who were both able to access the platform reliably and willing to contribute within the allotted time frame. Despite this limitation, the participants' expertise may have contributed to the production of meaningful and high-quality post-edited outputs, despite the relatively small size of the contributor group.

In crowdsourced translation, proofreading and post-editing are critical components for ensuring the quality of the final product (Tatsumi et al., 2012). In the present study, three expert proofreaders independently reviewed multiple post-edited versions of each of the 15 challenging instances. Table 3 summarizes the number of options selected by each proofreader, revealing that most proofreaders did not limit themselves to a single option. This reflects both their expertise and the inherently interpretive nature of translation, particularly in nuanced health-related contexts. For instance, in Question 1, Proofreaders 1 and 3 each selected five options, while Proofreader 2 chose four options. A similar pattern recurred across most instances, suggesting that multiple post-edited versions were considered acceptable. The fact that expert reviewers consistently identified several plausible solutions illustrates the flexibility required in post-editing, as linguistic, semantic, and pragmatic considerations often allow for multiple valid translations of the same source text. Interestingly, in Question 7, a different pattern emerged: one proofreader selected only a single option, while the others selected two. This variation may indicate that certain source sentences are more precise or unambiguous, reducing the range of acceptable post-edited outputs.

These observations highlight that multiple-option selection is not a limitation but a strength of the expert-driven workflow. It reflects the complexity and interpretive richness of translation tasks, in which multiple revisions may equally convey the intended meaning, maintain lexical appropriateness, and ensure cultural sensitivity. By systematically capturing these choices, the study demonstrates how expert-driven crowdsourcing allows for a broader exploration of translation solutions, providing insights into decision-making processes that are often inaccessible in open, nonexpert crowdsourcing models. Moreover, the selection patterns suggest potential implications for workflow optimization. Since the expert crowdsourcers themselves produced multiple high-quality post-edited versions, these findings may indicate the potential for streamlining certain aspects of the post-editing workflow in similar contexts. However, this interpretation should be approached with caution, as expert proofreaders remained an integral part of the evaluation process in the present study. Further comparative research is needed to

determine the extent to which different levels of proofreading may influence translation quality, particularly in high-stakes or specialized domains.

Overall, these results underscore that expert decision-making in closed crowdsourcing is both rigorous and nuanced. They suggest that even a small, highly skilled group can produce multiple acceptable post-edited versions, providing rich data for analyzing translation quality, improving post-editing practices, and informing the design of future expert-driven crowdsourcing workflows.

Although participation represented a small proportion of the overall Telegram community, the data collected were sufficient to achieve the study's objectives. As discussed earlier, participation was influenced by platform accessibility and the voluntary nature of the task within a specific and short time frame. The limited number of participants aligns with the microtask design of the study, which prioritized focused, manageable workloads to maintain engagement and ensure high-quality contributions. Microtask-based post-editing relies on precision rather than volume, allowing a small number of highly competent contributors to generate meaningful insights. In this context, data saturation was achieved: by the time 30 participants had completed the post-editing tasks, additional contributions were unlikely to yield new insights or substantially different post-edited versions. The quality and interpretive richness of the data suggest that participant expertise played an important role in shaping the usefulness of the post-edited outputs within the context of the present study. This pattern also reflects typical participation dynamics in online communities. Nielsen's (2006) 90-9-1 rule observes that 90% of users are passive, 9% contribute occasionally, and 1% generate most of the content. While this rule is descriptive rather than prescriptive, it contextualizes the observed engagement patterns: a small, active minority can produce the majority of high-quality contributions. Among the 856 members who saw the task announcement, the 30 active participants exemplified this principle, demonstrating that a small, skilled cohort can contribute to meaningful post-editing outcomes.

It is important to note that participation was shaped not only by expertise but also by external constraints. Internet filtering, connectivity limitations, and the short time window may have prevented other qualified members from contributing. Consequently, the participant pool represents a combination of accessibility, interest, and skill. Although this limits generalizability, it does not undermine the interpretive value of the findings: the focus was on an in-depth qualitative examination of expert post-editing processes rather than on producing a statistically representative sample.

Finally, these observations highlight the practical benefits of closed, expert-driven crowdsourcing. Despite the small number of contributors, the quality of the post-edited outputs, combined with the diversity of acceptable solutions identified, suggests that expert participation can contribute to data richness, analytical depth, and high-quality translation outcomes. These observations suggest that, in specialized domains, the effectiveness of crowdsourcing may depend more on the expertise of crowdsourcers than on the number of contributors involved.

5. Conclusion and Implication

This study highlights the potential of a closed, expert-driven crowdsourcing model in the post-editing phase of translation. Unlike open crowdsourcing models, in which crowdsourcers may lack formal training, participants in this study possessed academic or professional backgrounds in translation, enabling informed engagement with linguistic and contextual challenges in post-editing tasks.

Although the study involved a relatively small number of participants (30 out of an expert population of approximately 5,000), the collected data appeared sufficient to address the study's objectives, as additional contributions were not expected to generate substantially different revisions or insights within the scope of the selected tasks. This suggests that, for specialized post-editing tasks, a limited group of qualified contributors may be sufficient to generate meaningful qualitative data.

The presence of multiple acceptable post-edited versions for individual translation instances reflects the inherently interpretive nature of translation and underscores the role of expert judgment in evaluating MT output. This finding indicates that expert-driven closed crowdsourcing can support high-quality post-editing and contribute valuable expertise to translation workflows. As the quality assessment process included expert proofreading, the findings primarily demonstrate the value of collaborative expert engagement in post-editing. Future research may further examine how different workflow designs influence translation quality and efficiency.

Finally, this study suggests that a carefully designed, expert-driven closed crowdsourcing approach has the potential to support quality-oriented post-editing, even with a relatively small number of participants. Future experimental and mixed-methods studies using grading procedures, statistical tests, and qualitative analysis could provide more precise evidence regarding translation quality improvement in CTPE.

The findings of this study have practical implications for translators, healthcare institutions, and language service providers seeking to improve linguistic comprehensibility in health-related communication. The closed crowdsourcing model examined here may inform best practices for organizing expert collaboration in post-editing tasks, particularly in sensitive domains in which accuracy and clarity are critical.

Future research may extend this model to other translation contexts, such as legal texts, journalistic content, or the translation of neologisms. Further studies are also encouraged to examine the combined use of MT and crowdsourcing to improve language access in healthcare through comparative or experimental designs, allowing for a more robust evaluation of quality outcomes across different post-editing models.

One limitation of this study relates to internet filtering and connectivity constraints in Iran, which affected participants' access to the Telegram platform. These technical restrictions

occasionally interfered with task participation and the voting process, as some votes were not successfully recorded without the participants being immediately aware of the issue.

In addition, participation was voluntary and time-bound, meaning that only a subset of the broader community engaged with the task. Although this aligns with the microtask design and supports high-quality contributions, it also suggests that the dataset reflects the outputs of an active minority rather than those of the full potential population of experts.

A further limitation concerns the use of a closed, expert-driven Telegram community with credential-based access. While this gatekeeping structure was necessary to ensure expertise and consistency in quality, it may have introduced power dynamics that shaped participation and interaction within the group. In addition, all participants were drawn from a single, academically oriented Iranian Translation Studies community. This cultural and institutional homogeneity may limit the transferability of the findings to other linguistic, cultural, or crowdsourcing contexts.

Nevertheless, given the study's qualitative and exploratory focus on expert post-editing practices rather than large-scale participation or statistical generalization, these limitations do not undermine the analytical depth or interpretive validity of the findings. Instead, they define the contextual boundaries within which the results should be interpreted.

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Appendices

Appendix 1: Sources Assigned for the Four Sets

Social Problems and Services Set	Diseases Set	Therapies and Medicines Set	Natural problem Set
Abuse	Allergies	Alternative medicines	Emergency
Aging and Aged Care	Anxiety	Arthritis	Environmental Health
Alcohol and drug services in Victoria	Asthma	Bones muscles and joints	First aid
Allied health	Behavioral disorder	Bowel	Heat
Australian health system	Brain and nerves	Centerline	Hospitals
Blood and blood vessels	Cancer	Contraception	Hygiene
Carer	Children's health	Dementia	Physical activity
Children and Family services	Chronic diseases	Ear nose and throat	Sleep
Disabilities	Depression	Grief loss and death	
Discrimination	Diabetes	Hair and nail	
Drugs	Digestive system	Heart	
Early Learning	Eating disorders	Hepatitis	
Education	Eyes	Men's Health	
Employment	Infections	Oral Health	
Family violence	Kidneys and bladder	Pregnancy and post-natal care	
Food safety standards	Pain	Sexual Health	
Genes and genetics	Parenting	Vitamins and minerals	
Health practitioners	Skin	Women's Health	
HIVAIDS	STI		
Housing	Tobacco reform		
Immunization	Wellbeing		
Legal issues			
LGBTIQA+			
Lungs			
Medical examinations			
Medications			
Mental health			
Migrants and refugees			
Online safety			
Other resources			
Palliative care			
Patient's rights			
Relationships			
Smoking			
Suicide			
Support			
Surgery			
Tax			
Tobacco reform			
Travel			
Voluntary Assisted Dying			
Young people			

Appendix 2

Full Set of 15 Instances with 5 Post-edited Versions

N o.	Original Version	Post-edited Version 1	Post-edited Version 2	Post-edited Version 3	Post-edited Version 4	Post-edited Version 5
1	Agorap hobia is not a specific disorder	برزن هراسی یعنی ترس از حضور در مکان های باز (آگورافوبی) یک اختلال خاص و مشخص نیست.	آگورافوبی را نمی توان اختلال در نظر گرفت.	ترس از حضور در مکان های باز (آگورافوبی) یک اختلال خاص نیست.	آگورافوبیا ترس از حضور در مکانهای باز، یک اختلال مشخص نیست.	نمی توان ترس از فضای باز را اختلال خاصی در نظر گرفت.
2	Your GP is usually your main provider of health care.	معمولا پزشک عمومی شما اصلی ترین فرد در رابطه با سلامت و بهداشت شماست.	پزشک عمومی (خانوادگی) شما، معمولا مهمترین فرد در ارائه خدمات سلامت و بهداشت به شما است.	معمولا پزشک عمومی مهم ترین فردی است که خدمات سلامت و بهداشت شما را فراهم می کند.	پزشک خانواده عمدتاً مسئول اصلی ارائه خدمات سلامت می باشد.	معمولا دکتر عمومی اصلی ترین خدمات سلامت و پزشکی را برای شما فراهم می کند.
3	Give them more frequent breastfeed.	مکرراً به آنها شیر مادر بدهید.	این نوزدان باید به میزان بیشتری از شیر مادر تغذیه کنند.	تغذیه با شیر مادر به دفعات نیاز است.	این نوزادان باید بیشتر از معمول، شیر مادر بخورند.	به آن ها به دفعات بیشتر شیر مادر بدهید.
4	Acknowledging that all palliative caring situations are unique	میدانیم که تمامی شرایط پرستاری منحصر به فرد هستند.	باید بدانیم که هر کدام از بیماری ها نیازمند پرستاری و مراقبت ویژه و مخصوص به خود هستند.	باید پذیرفت که هر بیماری، مراقبت های ویژه خود را دارد.	باید دانست که هر نوع بیماری، مراقبت های ویژه خود را می طلبد.	باید بدانیم هر بیماری ای که نیاز به مراقبت تسکینی دارد، در نوع خود منحصر به فرد است.
5	You can verbally model words or phrases for your child to use	شما می توانید به صورت شفاهی از عبارات و کلمات دارای مفهوم الگویی برای فرزندتان استفاده کنید.	می توانید به صورت شفاهی کلمات و عباراتی را مدل سازی کنید تا فرزندتان بتواند آن ها را به کار ببرد.	شما می توانید به صورت شفاهی از کلمات و عبارات، مدل هایی برای استفاده کودکان ایجاد کنید.	می توانید کلمات و عباراتی را بکار ببرید که فرزندتان بتواند تقلید کند.	شما می توانید در صحبت های خود از کلمات و جملاتی استفاده کنید که کودکان بتوانند از آنها الگو گرفته و تقلید کنند.
6	Showing your child the object you are talking about can help them to understand that they have names	نشان دادن شی ای که درباره آن صحبت می کنید می تواند در درک اینکه هر چیزی اسمی دارد به کودکان کمک کند.	وقتی با کودکان درباره چیزی صحبت می کنید، آن را به کودک نشان دهید تا بفهمد هر چیزی یک اسم دارد.	با نشان دادن اشیاء به کودک در حین صحبت، به او در درک اسمی کمک کنید.	نشان دادن شی ای که در مورد آن صحبت می کنید به کودک کمک می کند تا متوجه شود اشیاء اسم دارند.	نشان دادن اشیایی که در مورد آنها صحبت می کنیم، به فرزندتان کمک می کند تا پیامود که آن اشیاء دارای نام هستند.
7	Adrenaline is the first line treatment for anaphylaxis	آدرنالین اولین دارو برای درمان آنافیلاکسی است.	آدرنالین درمان اصلی آنافیلاکسی (حساسیت شدید ب پروتئین ها) است.	اصلی ترین دارو برای درمان بیماری آنافیلاکسی یا بیش دفاعی، آدرنالین است.	آدرنالین داروی اصلی آنافیلاکسی یا همان حساسیت به پروتئین ها است.	اولین دارو برای درمان حساستهای خطرناک پوستی (آنافیلاکسی)، آدرنالین است.
8	Asthma is a medical condition that affects the airways (the breathing tubes that carry air into our lungs).	آسم بیماری ای است که مجرای تنفسی (لوله های تنفسی عبور هوا به شش ها) را تحت تاثیر قرار میدهد.	آسم یک وضعیت پزشکی است که مجاری تنفسی (لوله های تنفسی که هوا را به ریه های ما می برند) را تحت الشعاع قرار می دهد.	آسم نوعی بیماری است که باعث تنگ شدن راههای هوایی، یا همان مجاری تنفسی که هوا را به درون ریه ها می برند، می شود.	نوعی اختلال که مجاری تنفسی (لوله های انتقال هوا به ریه) را درگیر می کند، آسم نام دارد.	آسم نوعی اختلال است که مجاری تنفسی (لوله های انتقال هوا به ریه) را درگیر می کند.
9	Oppositional Defiant Disorder is a term used to describe children who become angry quickly and argue a lot.	کودکانی که زودرنج، خشمگین و اهل مجادله باشند دچار اختلال بی اعتنائی و مخالف ورزی هستند.	اختلال بی اعتنائی (ODD) نوعی بی داری در کودکان است و علائم آن زودرنجی، پرخاشگری، و دعوا کردن زیاد است.	اختلال نافرمانی و بی اعتنائی در توصیف کودکان زود رنج و سستی زو بکار می رود.	زود رنجی، پرخاشگری و دعوا کردن از علائم بی داری (اختلال بی اعتنائی) است.	مخالفت ورزی و بی اعتنائی برای توصیف کودکانی است که زود عصبانی می شوند و زیاد دعوا می کنند.

10	Adults and children older than six months who live in a household with a person who fits into any of the categories above.	بزرگسالان و کودکان بزرگتر از شش ماه که در خانواده با شخصی که در یکی از دسته بندی های بالا قرار میگیرد زندگی می کنند.	بزرگسالان و کودکان بالای شش ماه که در خانواده با شخصی زندگی می کنند که در یکی از گروه های بالا قرار می گیرد.	بزرگسالان و کودکان بالای شش ماه که در خانواده با فردی زندگی می کنند که آن فرد در یکی از طبقه بندی های فوق قرار می گیرد.	در دسته بندی هایی که ذکر شد افراد خاصی قرار میگیرند که کودکان بزرگتر از ۶ ماه و سایر بزرگسالان با آنها زندگی می کنند.	بزرگسالان و کودکان بالای شش ماه که در خانواده خود با شخصی زندگی می کنند که آن شخص در یکی از دسته بندی هایی که درباره ی آن توضیح داده شد، قرار می گیرد.
11	Early Start Kindergarten gives three-year old children from a refugee or asylum seeker background 15 hours per week of free or low cost kindergarten.	برنامه زودتر از موعد برای کودکان سه ساله پناهنده یا پناهجو ۱۵ ساعت مهدکودک رایگان یا کم هزینه در هفته را فراهم میکند.	برنامه زود هنگام مهدکودک به کودکان سه ساله پناهنده یا پناهجویان ۱۵ ساعت خدمات رایگان و یا خدماتی با هزینه کم ارائه می دهد.	۱۵ ساعت در هفته مهد کودک کم هزینه یا رایگان برای کودکان ۳ ساله ی پناهنده و پناهجویی که مهد کودک را زودتر از موعد آغاز کنند ارائه می شود.	برای کودکان خانواده ی پناهندگان یک برنامه شروع زودتر مهدکودک در نظر گرفته شده که طی آن کودکان می توانند از ۱۵ ساعت خدمات رایگان و یا کم هزینه استفاده کنند.	برنامه شروع زود هنگام مهدکودک برای کودکان سه ساله با پیشینه ی پناهنده یا پناهجو، ۱۵ ساعت در هفته مهدکودک رایگان یا ارزان فراهم می کند.
12	For minor procedures, you may only need to stay for a day, but for ongoing treatment or major surgery, you will need to stay longer.	ممکن است برای عمل های سرپایی لازم باشد یک روز بستری شوید ولی برای درمان های مداوم و یا جراحی های بزرگ به مدت زمان بیشتری برای بستری نیاز داشته باشید.	برای جراحی های جزئی، تنها لازم است یک روز بستری باشید اما برای درمان های مداوم یا جراحی های بزرگ به زمان بستری طولانی تری نیاز است.	ممکن است برای عمل های جراحی سرپایی تنها یک روز بستری شوید، اما برای جراحی های مهم تر باید مدت زمان بیشتری در بیمارستان تحت نظر باشید.	برای عمل های جراحی سرپایی تنها به یک روز بستری نیاز است، اما برای جراحی های مهم باید مدت زمان بیشتری تحت مراقبت باشید.	جزئی و درمان های سرپایی فقط به یک روز بستری نیاز دارید اما برا جراحی های مهم باید مدت زمان بیشتری بستری و تحت مراقبت باشید.
13	An asthma flare-up can become serious if not treated properly.	عود بیماری آسم در صورت عدم درمان جدی است، حتی زمانیکه فرد آن را به خوبی کنترل می کند.	حتی افرادی که بیماری آسم خود را کنترل می کنند، در صورتی که درمان نامناسب داشته باشند ممکن است باعث تشدید این بیماری بشوند.	حملات بیماری آسم در صورت عدم درمان، می تواند بحرانی شود، حتی در فردی که بیماری او تحت کنترل است.	در صورت درمان نامناسب، آسم بطور جدی عود می کند، حتی در افرادی که معمولا آسم را به خوبی کنترل می کنند.	اگر درمان صحیحی در بیماری آسم صورت نگیرد، حتی در موارد کنترل شده، می تواند تشدید شود.
14	Victoria is fortunate to have a diverse range of public and private hospitals spread across both metropolitan and regional centers state-wide.	ایالت ویکتوریا به دلیل دارا بودن بیمارستان های خصوصی و عمومی در داخل و حاشیه شهر دارای امتیاز است.	خوشبختا نه در ایالت ویکتوریا، تعداد زیادی بیمارستان دولتی و خصوصی، هم در مناطق شهری و هم در مناطق روستایی، وجود دارد.	باعث خرسندی است که در مناطق شهری و روستایی ایالت ویکتوریا، تعدادی بیمارستان دولتی و خصوصی وجود دارد.	خوشبختا نه در ایالت ویکتوریا، بیمارستان های دولتی و خصوصی زیادی، هم در مناطق شهری و هم در مناطق روستایی، خدمات می دهند.	خوشبختانه در مناطق مختلف ایالت ویکتوریا اعم از شهری و روستایی، تعداد زیادی بیمارستان دولتی و خصوصی وجود دارد.
15	Urinating or opening their bowels in places they should not	ادرار و مدفوع کردن در مکانهای ممنوعه.	افراد در مکانهای ممنوع ادرار و مدفوع کنند.	دستشویی کردن (ادرار یا مدفوع) در مکان هایی نامناسب.	تخلیه ادرار و مدفوع در مکان های ممنوع.	ادرار و مدفوع در جاهایی که جایز نیست

Appendix 3

The Challenging Instances Provided for the Proofreaders

Original Instance	Google Translate Version
Agoraphobia is not a specific disorder	آگورافوبیا یک اختلال خاص نیست.
Your GP is usually your main provider of health care.	پزشک عمومی شما معمولاً ارائه دهنده اصلی مراقبت های بهداشتی شما است.
Adrenaline is the first line treatment for anaphylaxis	آدرنالین خط اول درمان آنافیلاکسی است.
Asthma is a medical condition that affects the airways (the breathing tubes that carry air into our lungs).	آسم یک وضعیت پزشکی است که راه های هوایی (لوله های تنفسی که هوا را به ریه های ما می برند) را تحت تاثیر قرار می دهد.
Oppositional Defiant Disorder is a term used to describe children who become angry quickly and argue a lot.	اختلال نافرمانی مخالف اصطلاحی است برای توصیف کودکانی که به سرعت عصبانی می شوند و زیاد بحث می کنند.
Acknowledging that all palliative caring situations are unique.	اذعان به اینکه همه موقعیت های مراقبت تسکینی منحصر به فرد هستند
Adults and children older than six months who live in a household with a person who fits into any of the categories above.	بزرگسالان و کودکان بزرگتر از شش ماه که در خانواده ای با شخصی زندگی می کنند که در هر یک از دسته های بالا قرار می گیرد.
You can verbally model words or phrases for your child to use.	شما می توانید به صورت شفاهی کلمات یا عباراتی را برای استفاده فرزندتان مدل کنید.
Showing your child the object you are talking about can help them to understand that they have names.	نشان دادن شی ای که در مورد آن صحبت می کنید، می تواند به او در درک کردن اینکه اشیا نامی دارند، کمک کند.
Early Start Kindergarten gives three-year old children from a refugee or asylum seeker background 15 hours per week of free or low cost kindergarten.	مهدکودک شروع اولیه به کودکان سه ساله پناهنده یا پناهجو 15 ساعت در هفته مهدکودک رایگان یا کم هزینه می دهد
For minor procedures, you may only need to stay for a day, but for ongoing treatment or major surgery, you will need to stay longer.	برای اعمال جزئی، ممکن است فقط یک روز نیاز باشد، اما برای درمان مداوم یا جراحی بزرگ، باید مدت بیشتری بمانید.
Give them more frequent breastfeed.	به آنها شیرهای مکرر بدهید.
An asthma flare-up can become serious if not treated properly, even in someone who normally has good asthma control.	شعله ور شدن آسم در صورت عدم درمان مناسب می تواند جدی شود، حتی در فردی که به طور معمول آسم را کنترل می کند
Victoria is fortunate to have a diverse range of public and private hospitals spread across both metropolitan and regional centers state-wide.	ویکتوریا خوش شانس است که طیف متنوعی از بیمارستان های دولتی و خصوصی را در سراسر مراکز شهری و منطقه ای در سراسر ایالت پراکنده کرده است.
Urinating or opening their bowels in places they should not.	ادرار کردن یا باز کردن روده ها در مکان هایی که نباید.