Research Square

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Organizational readiness for implementing a vaccine flow protocol in the Primary Health Care of a Brazilian municipality

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Abstract

Background

The fall in vaccination coverage observed in Brazil poses an urgent need for strategies to reorganize health services with a focus on increasing this coverage, since vaccination represents one of the most effective interventions in infectious diseases prevention. The flow protocol for increasing the vaccination coverage of pregnant women and children under two years of age was developed as a strategy to be implemented in all the vaccination rooms of a municipality in the north of Espírito Santo, Brazil. This study assessed Primary Health Care professionals' readiness for change in relation to the implementation of the protocol for the vaccination service.

Methods

Using a quantitative cross-sectional design, we assessed the length of time working and the readiness to change among Primary Health Care professionals, following training offered by the municipal immunization coordinator. The research was conducted with 168 professionals, including physicians, receptionists, community health workers, vaccinators, nurses and health unit coordinators. Participants answered the questionnaire *Organizational Readiness for Implementing Change* (ORIC-Br), validated in the Brazilian context, which assesses two domains: collective effectiveness and commitment to change. Descriptive statistics and the software Stata v17.0 were used to analyze the data from the ORIC-Br. The results were presented in tables and graphs to illustrate the levels of readiness among the participants.

Results

The results showed a high level of organizational readiness among health professionals, with average scores of 48.97 on a scale ranging from 11 to 55. The internal consistency analysis, using Cronbach's alpha, confirmed the tool's high reliability (0.94).

Conclusion

Although the health professionals display determination to and confidence in executing the changes brought about by the protocol, their implementation and sustainability transcend individual capacity. Commitment to organizational change requires, in addition to individual effort, structural guarantees and effective support from managers to overcome barriers and setbacks inherent to the process. This is the first study to demonstrate health professionals' readiness for change in the context of the implementation of a protocol aimed at increasing vaccination coverage in a remote region of Espírito Santo, Brazil, and represents a relevant reference for health implementation studies at national and international level.

Context

Vaccination is one of the most cost-effective and powerful interventions in infectious disease prevention, significantly reducing infant mortality [1]. In Brazil, vaccination is conducted by the National Immunization Program (PNI), which is responsible for distributing 48 immunobiologicals throughout the country, including 31 vaccines, 13 serums and 4 immunoglobulins, in line with World Health Organization recommendations [2].

The effectiveness of the PNI's activities is measured by vaccination coverage (VC) data, which, despite efforts, has fallen in recent years in Brazil [3]. The Brazilian Ministry of Health's coverage targets are 90% for BCG and Rotavirus and 95% for the other vaccines; however, since 2016 there has been a 10 to 20 percentage point drop, aggravated by the COVID-19 pandemic, the political-economic crisis and misinformation about vaccines [4, 5]. Between 1994 and 2019, the national VC average was 73.49%, with BCG leading the way (100%) and low coverage of human Rotavirus (58.57%), Yellow Fever (37.72%) and Meningococcal C (61.23%) [3]. In recent years, this coverage has fallen throughout the country [6, 7].

This reality of the Immunization Program is reflected in the municipality of São Mateus, a city in the north of Espírito Santo state, which faces multiple challenges to achieve its vaccination targets. According to data from the State Health Department [6], the VC in São Mateus between 2021 and 2023 remained below 90%, except for the BCG vaccine. In 2024, the municipality improved its VC percentage and reached targets for the BCG vaccine, Hepatitis B at birth and PCV-10, reporting a fall in coverage only for the chickenpox vaccine due to national shortages.

Failure to reach vaccination targets necessitates the adoption of intervention strategies to reverse the scenario. In this context, 11 health professionals from three Basic Units – selected intentionally to represent the coastal, urban and rural areas of the municipality – had access to the situational diagnosis of the vaccine rooms. Based on this diagnosis, structural, material and human resources problems were identified, as well as flaws in work processes. Accordingly, the group devised a flow protocol with the aim of increasing the vaccination coverage of pregnant women and children aged under two.

It is understood that intervention strategies can be employed by health professionals to improve vaccination coverage results, with the implementation requiring their commitment and willingness to change. Thus, in implementation science, organizational readiness for change in health services represents a strategy for evaluating this commitment and is considered an important precursor for the successful implementation of changes in the various organizational configurations of health, especially with regard to technological innovations, public policies and health programs [8].

In this context, directly involved staff have demonstrated a willingness and ability to accept and implement the changes proposed by the organization [8, 9]. As part of the overall evaluation, it was important to first assess whether the health professionals were prepared to commit to implementing the vaccine flow protocol. The successful implementation of new strategies or practices hinges on collective

support within an organization to facilitate the transition process and guarantee the success of change initiatives in organizations [10].

The aim of this study was to assess Primary Health Care professionals' readiness for change in relation to the implementation of the protocol for the vaccination service. It should be highlighted that this study aligned with the UN Sustainable Development Goals and, in particular, with SDG 3 [11].

Methods

Type of Research: Quantitative cross-sectional study to assess Readiness for Change. Organizational readiness to implement change is defined as the extent to which professionals in a health service are prepared, both psychologically and behaviorally, to adopt and implement a new initiative or change [12]. The study used the Brazilian version of the Organizational Readiness for Implementing Change (ORIC-Br), a duly validated tool in Brazil, capable of measuring the domains of commitment to change and collective effectiveness. The ORIC-Br proved to be valid and reliable, consolidating its applicability in healthcare organizations in the Brazilian context [13].

The ORIC-Br questionnaire contains 11 items that correspond to the domains of commitment and effectiveness. It uses a 5-point Likert scale (1 = strongly disagree and 5 = strongly agree). Items 1, 3, 5, 8 and 10 measure the commitment to implement the change, with a minimum score of 5 and a maximum of 25, and items 2, 4, 6, 7, 9 and 11 measure the effectiveness of the collective capacity to execute this change, with a minimum score of 6 and a maximum of 30. It should be noted that the ORIC-Br tool does not have cut-off points previously established in the literature to classify levels of organizational readiness, so the results should be interpreted based on the average score and the context of the organization studied. Thus, the higher the score, the higher the level of organizational readiness for change. The ORIC-Br tool takes an average of 5 minutes to apply and can be used in different contexts and organizations in the health sector, covering processes of change in remote and/or rural services [14], the use of artificial intelligence [9], among other aspects.

Study setting and participants: The research was conducted in the 25 Primary Health Care (PHC) service vaccination rooms in the municipality of São Mateus, in the north of Espírito Santo, Brazil. The municipality is one of the oldest cities in the country, with a total area of 2,338.727 km², equivalent to 5.12% of Espírito Santo's territory. With an estimated population of 134,423 (IBGE, 2025), the municipality provides care for the population's health needs through the Unified Health System (SUS).

In the context of PHC, the total staff consisted of 272 health professionals, including 128 Community Health Agents (CHA), 39 physicians, 38 nurses, 33 receptionists, 20 vaccinators and 14 Health Unit coordinators.

As regards the immunization service, only 8 rooms had vaccinators. Importantly, the municipality has, for roughly four years, struggled to retain dedicated immunization service vaccinators in all 25 vaccination rooms, resulting in a high turnover.

The participants were health professionals in managerial positions, professionals involved in care and professionals from the vaccination rooms of all the Health Units. The inclusion criteria were: health professionals who were working at the Basic Health Units during the research period and who had undergone the immunization training, while the exclusion criteria were: professionals who were off work during the research period and who had not undergone the immunization training. The immunization training for PHC professionals was administered by the municipal immunization coordinator, consisting of a 5-hour course. It covered the national vaccination calendar, presented the flow protocol for increasing vaccination coverage of pregnant women and children under two and how it would be implemented in the service.

After the training, the participants were invited to take part in the research and those who accepted signed the Informed Consent Form (ICF). They answered two questionnaires, one containing information on the length of time they had worked in and outside of PHC and the other corresponding to the ORIC-Br form. Data was collected from June 25 to October 29, 2025.

Data Analysis: Descriptive analysis was performed to describe the length of time of professional activity and the overall ORIC scores. Subsequently, the mean score and standard deviation (SD) of the ORIC-Br mean were analyzed according to group of professionals, along with effectiveness and commitment. Cronbach's alpha was used to assess the internal consistency and reliability of the scales, where values closer to 1 indicate greater reliability between the indicators. Values above 0.7 were considered satisfactory and below 0.6 unsatisfactory, suggesting low consistency [15]. The differences between the scores of the groups of professionals were examined by one-way analysis of variance (ANOVA), with a significance level specified at 0.05. The analyses were carried out using STATA v17.0 (College Station, TX).

Ethical approval: The study was approved by the Research Ethics Committee of the Centro Universitário do Norte do Espírito Santo, of the Federal University of Espírito Santo (UFES), through the Brazil Platform, in accordance with Resolution 466/2012. All the participants signed the informed consent form. As the study was carried out in the SUS network, the guidelines of CNS/MS Resolution No. 580/2018 were also observed.

Results

From the total of 272 Family Health Strategy (FHS) professionals, 11 who participated in drawing up the protocol were excluded, resulting in 261 professionals who qualified to take part in the research. Effectively, 168 (64.36%) professionals participated, including 66 (39.3%) CHAs, 26 (15.4%) receptionists, 25 (15.0%) physicians, 23 (13.7%) nurses, 16 (9.5%) vaccinators and 12 (7.1%) health unit coordinators.

The median length of professional experience for most of the participants was relatively short, between 0 and 5 years (69.66%), with the exception of the CHAs, most of whom had more than 15 years' experience (51.52%). With regard to exclusive experience in the FHS, all the CHAs reported more than 5 years (100%), the physicians were concentrated in the 1 to 5 year range (68%), and the other

professionals had a median time of less than 1 year (44.7%) of experience in the FHS (Table 1). This shorter time working in the FHS may act as a motivating factor for understanding the complexity of the territory, supporting a receptive attitude toward and the implementation of innovative strategies, such as the vaccine flow protocol.

Table 1. Professional experience of the research participants. (n=168)

Professional Category	Variable	Years	N	%
CHA (n = 66)	Years of professional experience	0-5	0	0.00%
		6-10	0	0.00%
		11-15	32	48.48%
		> 15 years	34	51.52%
	Time working in the FHS	≤ 1 year	0	0.00%
		1-5	0	0.00%
		> 5 years	66	100.00%
Receptionist (n = 26)	Years of professional experience	0-5	17	73.91%
		6-10	3	13.04%
		11-15	2	8.70%
		> 15 years	4	17.39%
	Time working in the ESF	≤ 1 year	18	78.26%
		1-5	5	21.74%
		> 5 years	3	13.04%
Physician (n = 25)	Years of professional experience	0-5	20	80.00%
		6-10	1	4.00%
		11-15	3	12.00%
		> 15 years	1	4.00%
	Time working in the ESF	≤ 1 year	8	32.00%
		1-5	17	68.00%
		> 5 years	0	0.00%
Nurse (n = 23)	Years of professional experience	0-5	15	65.22%
		6-10	5	21.74%
		11-15	0	0.00%
		> 15 years	3	13.04%
	Time working in the FHS	≤ 1 year	8	34.78%
		1-5	8	34.78%
		> 5 years	7	30.43%

Vaccinator (n = 16)	Years of professional experience	0-5	10	62.50%
		6-10	3	18.75%
		11-15	0	0.00%
		> 15 years	3	18.75%
	Time working in the ESF	≤ 1 year	7	43.75%
		1-5	3	18.75%
		> 5 years	6	37.50%
Health Unit Coordinator (n = 12)	Years of professional experience	0-5	8	66.67%
	Time working in the ESF	6-10	0	0.00%
		11-15	1	8.33%
		> 15 years	3	25.00%
	Time working in the FHS	≤ 1 year	8	66.67%
		1-5	0	0.00%
		> 5 years	4	33.33%

Legend: N: number of participants, %: proportion of the total (n=168).

The overall median readiness for change given by the ORIC-Br was 48.97 (range 11-55), demonstrating a high level of readiness to start implementing the vaccine flow protocol. In this segment, the average commitment to change score was 22.55 (range 5-25), indicating that professionals are highly determined to implement the protocol. The effectiveness of change domain had an average of 26.67 (range 6-30), which index reflects the team's confidence in their collective potential to successfully implement the changes (Table 2). Standard deviation was used to assess the dispersion of the data in relation to the mean, allowing for analysis of the variability in the participants' responses and the consistency of the results obtained, with higher values reflecting greater dispersion between the observations.

The internal reliability of the ORIC-Br was assessed using Cronbach's alpha coefficient, with an overall reliability coefficient of 0.94, indicating a very high quality, which is also considered satisfactory.

There was a statistically significant difference between the means of the groups of professionals, using one-way analysis of variance (ANOVA), considering a significance level of 0.05 ($p = 0.0003$). The variable analyzed was the overall organizational readiness score, obtained by totaling the scores for the effectiveness and commitment domains of the ORIC-Br tool. A p-value of less than 0.05 indicates rejection of the hypothesis of equality between the groups. Statistically significant differences were observed between health unit coordinators and receptionists, and between receptionists and CHAs. In

the post-hoc analysis with Bonferroni correction, there was a statistically significant difference between health unit coordinators and receptionists (p = 0.030) and between receptionists and CHAs (p = 0.001), with no differences between the other groups.

Table 2 – Median scores by professional category for readiness by domains obtained from the ORIC-Br. (n=168)

Professional Category	N	(%)	Mean Effectiveness (SD)	Mean Commitment (SD)	Mean ORIC-Br Score (SD)
Physicians	25	14.88	25.16 (4.05)	22.04 (3.18)	47.24 (6.90)
Coordinators	12	7.14	28.5 (1.93)	24.16 (1.46)	52.66 (3.33)*
Vaccinators	16	9.52	25.68 (5.94)	20.87 (5.22)	46.56 (11.12)
Receptionists	26	15.48	24.23 (6.33)	20.61 (4.94)	44.84 (11.06)*
Nurses	23	13.69	25.65 (2.94)	22.08 (2.90)	47.73 (5.43)
CHA	66	39.29	27.80 (2.88)	23.80 (1.89)	51.6 (4.65)*
TOTAL	**168**	**100 %**	**26.67 (4.22)**	**22.55 (3.45)**	**48.97 (7.54)**

Legend: N: number of participants by professional category, %: proportion of the total (n=168).
*p=0.0003

Most of the participants agreed with the statement about the effectiveness of the change: “The people who work here want to implement this change”, 120 agreed (71.43%), followed by the statement “The people who work here will do whatever it takes to implement this change”, 110 (65.48%); and with the statements about commitment to change: “The people who work here feel confident that the organization will support them as they adapt to this change”, 100 (59.52%), followed by “The people who work here feel confident that they will be able to keep up the pace of implementing this change”, 94 (55.95%).

Participants who disagreed with the statements about the effectiveness of the change: 3 disagreed (1.79% each): “The people who work here are determined to implement this change”, “The people who work here want to implement this change” and “The people who work here are committed to implementing this change”. The participants’ responses to all 11 ORIC-Br statements, grouped by statement, are shown in Figure 1.

Discussion

This study assessed the organizational readiness of 168 PHC health professionals for change following the implementation of a vaccination flow protocol. With a score of 48.89, the professionals reported high organizational readiness for change, together with high commitment and high collective effectiveness of

the change in PHC. The results of this study indicate that the participating teams have a solid foundation of determination and confidence, elements that Weiner's theory [16] identifies as fundamental precursors to the persistent effort and cooperation needed in complex organizational transitions [8]. However, international literature emphasizes that a high level of readiness, although essential, does not guarantee the sustainability of change if there is not continuous structural support [17].

The high level of motivation among health professionals to implement the vaccination protocol identified in the municipality of São Mateus, Espírito Santo, is in line with the findings of studies carried out in middle and low-income international settings, although there are significant differences in terms of implementation capacity. On the south-west coast of West Africa, in Sierra Leone, for example, the assessment of readiness for a preceptorship program in obstetrics revealed higher averages for commitment than for effectiveness, showing that willingness to change often clashes with technical or operational limitations resulting from a lack of resources [9]. By contrast, the teams in this study showed high confidence in their ability to coordinate tasks, which may indicate that the vaccine flow protocol was perceived as an intervention compatible with already consolidated technical skills, thus reducing the uncertainty that often jeopardizes adherence and execution in implementation processes.

These results may also be related to the participatory nature of the protocol's implementation, since the definition of actions, operational flows and contextual adjustments involved the direct involvement of local teams. Collaborative strategies tend to increase acceptability of the intervention, strengthen professional engagement and reduce initial resistance to change [18].

Nonetheless, this interface between readiness and the structural context must be critically evaluated; the vaccination coverage results with implementation of the protocol associated with structural and resource improvements could be even more significant. In Australia, professionals in transition to new obstetric care models had a mean score of 41.5 (scale 12-60), demonstrating that readiness is an adaptive concept influenced by role clarity and previous organizational culture [12]. Experience in low- and middle-income countries has shown that although readiness is associated with the availability of resources and patient satisfaction, it may not translate into instant adherence to the program if external factors such as physical infrastructure and personnel management are neglected [8]. In Brazil, the heterogeneous incorporation of protocols into the SUS reflects this challenge: motivation among the front line is often limited by the lack of investment that would support the transformation of intended change into safe care practices [8, 17].

Furthermore, it is essential to consider the nature of the changes made during the implementation period. According to the FRAME framework [19], adaptations made in a reactive way or without delineation can affect the fidelity of the intervention. The high levels of organizational readiness observed in São Mateus act as a buffer against drift, allowing the team, even in the face of adversity, to try to return to the core elements of change in a way that is consistent with the expected fidelity. However, staff turnover and lack of materials, identified as local barriers, impose a risk of adaptations

“inconsistent with the fidelity”, where the essence of the improvement is sacrificed in favor of immediate operational survival.

The data therefore reinforces that the São Mateus PHC has a psychologically favorable environment for innovation, but materializing this readiness into sustainable public health results requires the municipal management to go beyond motivational incentives. The diagnosis of organizational readiness needs to be institutionalized as a strategic planning tool, allowing for the identification of institutional support and priority structural investments. Without this link between the collective will of the teams and the structural conditions provided by the public system, readiness runs the risk of remaining just a potential that does not materialize into lasting transformations in health care.

Study Limitations

One limitation of this study is that it was conducted in a single municipality and may not represent all PHC contexts in the country. Another limitation was that the study was based exclusively on the ORIC-Br tool, which, although validated in Brazil, may not fully capture the contextual nuances of organizational readiness for change, but can be used to guide the planning of vaccination interventions.

Conclusion

The results of this study show a high level of organizational readiness for change among PHC health professionals in relation to reorganizing the vaccination service by implementing the vaccination flow protocol with a view to increasing coverage for pregnant women and children under two. The high levels of commitment and collective effectiveness measured by the ORIC-Br tool suggest that the teams are psychologically prepared and confident in their ability to implement the proposed changes.

Although health professionals show engagement and see themselves as capable of implementing the changes resulting from the adoption of the protocol, its implementation and sustainability transcend individual capacity. Commitment to organizational change requires, in addition to individual effort, structural guarantees and effective support from managers to overcome barriers and setbacks inherent to the process. This is the first study to demonstrate health professionals’ readiness for change in the context of the implementation of a protocol aimed at increasing vaccination coverage in a remote region of Espírito Santo, Brazil, and represents a relevant reference for health implementation studies at national and international level.

Declarations

Ethical approval and consent to participate

The data collection methods were devised in accordance with the guidelines of the principles of ethics in research with Human Beings. Ethical approval for this study was granted by the Research Ethics Committee of the Federal University of Espírito Santo, Centro Universitário do Norte do Espírito Santo

with report number 7.645.031 and Certificate of Submission for Ethical Appraisal (CAAE) number 85086324.1.0000.5063. Informed consent to take part in the study was obtained from all participants.

Consent for publication

Not applicable.

Availability of data and materials

All materials belong to the authors of this manuscript and none belong to third parties.

Contact to obtain access to the study's raw data: Bruna Nunes Queiroz (Email: brunanq@gmail.com)

Conflict of interest

The authors declare no conflict of interests.

Contributions of the authors

Conception and design of the study: BNQ, ANMP. Data collection BNQ, RGSS, ANMP. Analysis and interpretation of the results: BNQ, RGSS, ANMP. Preparation of the draft manuscript: BNQ, RGSS, SMC, WSL, MPC, ANMP. All the authors have reviewed the results and approved the final version of the manuscript.

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Figures

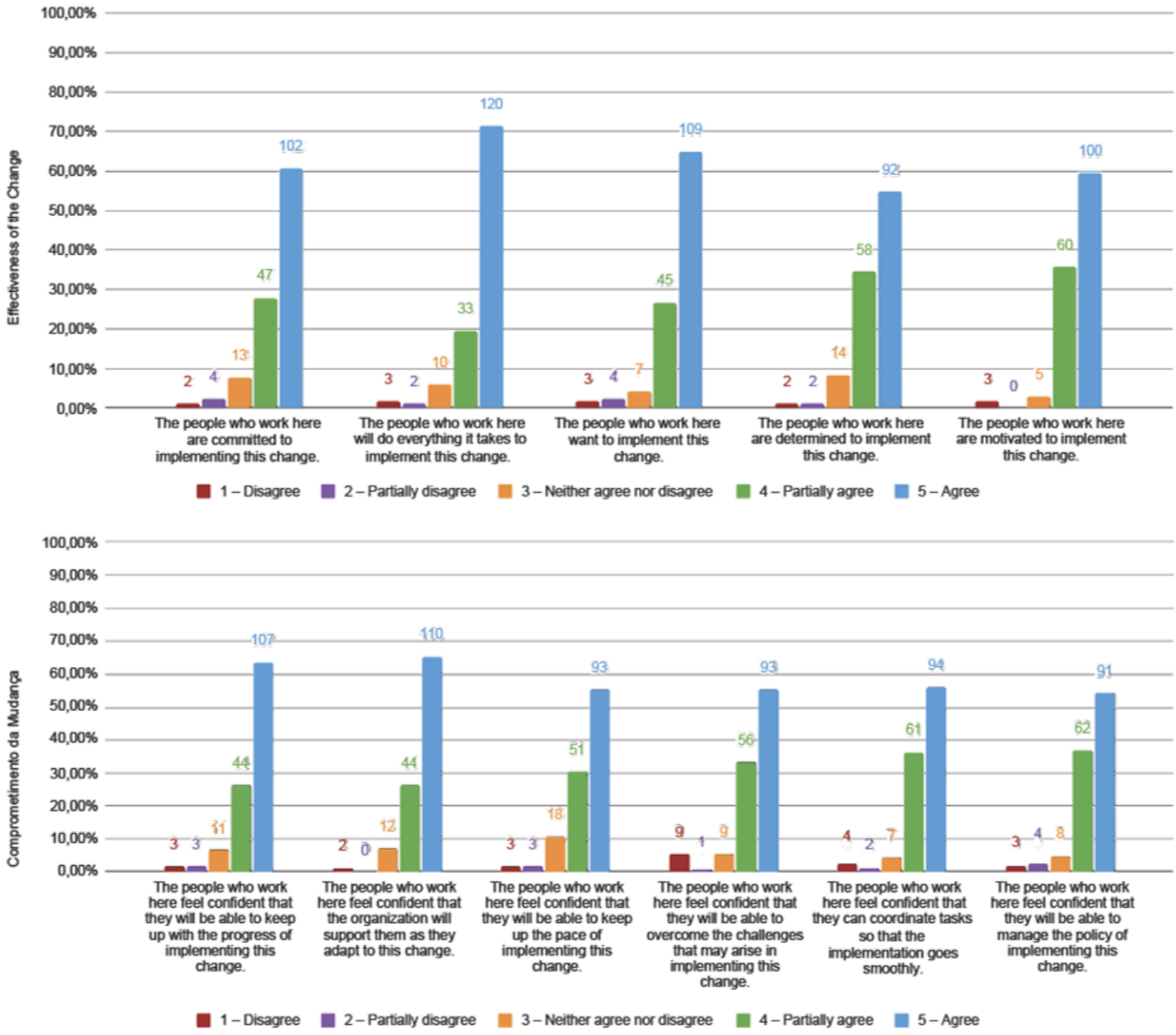


Figure 1

Participants' response categories (N) by statements (%) in the ORIC-Br with 11 items. (n=168)