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CLINICAL ARTICLE

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The impact of hypertension, hemorrhage, and other maternal morbidities on functioning in the postpartum period as assessed by the WHODAS 2.0 36-item tool

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Abstract

Objective: To assess the scores of postpartum women using the WHO Disability Assessment Schedule 2.0 36-item tool (WHODAS-36), considering different morbidities.

Methods: Secondary analysis of a retrospective cohort of women who delivered at a referral maternity in Brazil and were classified with and without severe maternal morbidity (SMM). WHODAS-36 was used to assess functioning in postpartum women. Percentile distribution of total WHODAS score was compared across three groups: Percentile (P)<10, 10<P<90, and P>90. Cases of SMM were categorized and WHODAS-36 score was assessed according to hypertension, hemorrhage, or other conditions.

Results: A total of 638 women were enrolled: 64 had mean scores below P<10 (1.09) and 66 were above P>90 (41.3). Of women scoring above P>90, those with morbidity had a higher mean score than those without (44.6% vs 36.8%, *P*=0.879). Women with higher WHODAS-36 scores presented more complications during pregnancy, especially hypertension (47.0% vs 37.5%, *P*=0.09). Mean scores among women with any complication were higher than those with no morbidity (19.0 vs 14.2, *P*=0.01). WHODAS-36 scores were higher among women with hypertensive complications (19.9 vs 16.0, *P*=0.004), but lower among those with hemorrhagic complications (13.8 vs 17.7, *P*=0.09).

Conclusions: Complications during pregnancy, childbirth, and the puerperium increase long-term WHODAS-36 scores, demonstrating a persistent impact on functioning among women, up to 5 years postpartum.

KEYWORDS
Hemorrhage; Hypertension; Maternal morbidity; Pregnancy; WHODAS 2.0

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1 | INTRODUCTION

According to the United Nations World Report on Disability, globally nearly 200 million people experience negative impacts on their functioning, which in turn creates difficulties in their economic participation, health access, and education improvement.[1] The International Classification of Functioning, Disability and Health (ICF) was created by the WHO[2] to assess and categorize different disabilities. Instruments that evaluate disability and functioning must be linked conceptually and operationally to the ICF, to allow comparisons between different populations worldwide. Addressing pregnancy- and childbirth-related short- and long-term disability among women is important in achieving women's health-related UN Sustainable Development Goals.[3] Daily, about 800 women die from pregnancy-related complications, but for each death, a dozen more women survive but may suffer lasting consequences.[4] Severe maternal morbidity has been extensively studied, with standardized definitions for potentially life-threatening conditions and maternal near miss.[5] Several women who survive will suffer altered functioning.[6]

The WHO Disability Assessment Schedule (WHODAS) 2.0 has 36 items (or 32, for women not working or studying) and has been translated into many languages for cross-cultural adaptation.[7] It is a psychometric scale based on the conceptual framework of the ICF, and captures individual dysfunction in six domains of daily activities (cognition, mobility, self-care, relationships with people, life activities, and participation). The total score ranges from 0 to 100, and a high score is indicative of a greater limitation in conducting activities of daily living.[8] The WHODAS 2.0 36-item version (WHODAS-36) intends to measure activity, function, and participation in daily living activities in the 30 days preceding its application.[9]

Our group has previously studied postpartum women with and without a history of severe maternal morbidity (SMM) and concluded that there was a significant difference among groups evaluated by WHODAS-36.[10] However, a study considering the impact of different underlying causes of morbidities on WHODAS scores and percentile results has not been performed, and a better understanding of the conditions that can be more closely related to future disability might enable specific interventions to improve maternal health in those cases.

The aim of the present analysis was to assess the higher WHODAS scores (most likely revealing impaired functionality), considering values above the 90th percentile (P>90), among women with a history of SMM, according to the underlying morbidities of hypertension, hemorrhage, and other (mostly indirect) causes of SMM.

2 | MATERIALS AND METHODS

We performed a secondary analysis of a retrospective cohort of women who delivered at a referral maternity hospital in Brazil. The methodological details of the main study have been published elsewhere.[10] Briefly, women who delivered between July 1, 2008, and June 30, 2012, at the Women's Hospital of the University of Campinas were identified. Of these, women who experienced SMM, according to the WHO criteria,[5] were eligible as the "exposed" group. A "nonexposed" group was composed of women without SMM, selected randomly in a 1:1 ratio, from a computer-generated list, by year of childbirth. The nonexposed group could include women with uncomplicated pregnancy and childbirth and women with nonsevere morbidity. Newborn outcomes were not considered in the selection of women. A chart review was performed for maternal and perinatal outcomes, and women were scheduled for a postpartum evaluation (ranging from 1 to 5 years after delivery), including the 36-item WHODAS 2.0 questionnaire conducted by trained interviewers of different backgrounds (doctors, nurses, and psychologists). Women who participated in the study provided informed consent.[10] The study was approved by the University of Campinas institutional review board (approval number 447/2009).

Interviews were initially recorded on paper charts. Data entry was done on a virtual database specifically built for the study using the LimeSurvey platform (www.limesurvey.org; LimeSurvey GmbH, Hamburg, Germany). Data were analyzed using SPSS version 2.0 (IBM, Armonk, NY, USA).

A total of 638 women were enrolled in the cohort, 315 in the exposed group and 323 in the nonexposed group. Groups had similar sociodemographic characteristics. In our current analysis, we categorized the percentile distribution of WHODAS-36 total score for all 638 women in the cohort. We further divided women into three groups: P<10 (women with scores below the 10th percentile), P>90 (women with scores above the 90th percentile), and 10<P<90 (a group composed of women who scored between the 10th and 90th percentiles). Data were compared using the *t* test and analysis of variance (ANOVA). A *P* value of 0.05 or below was considered statistically significant.

Data on median, mean, and standard deviation of WHODAS-36 score were analyzed for the three groups. Within the percentile groups, women were then divided into two categories: those with and those without maternal morbidity. Furthermore, the women with morbidity were then grouped by different underlying causes of maternal morbidity: hypertensive disorders (including pre-eclampsia, gestational hypertension, and chronic hypertension), hemorrhage, or other conditions (including obesity; low weight; diabetes; smoking; heart, kidney, or pulmonary diseases; sickle cell anemia; HIV/AIDS; thyroid diseases; neurologic diseases/epilepsy; collagenosis; and cancer). The underlying morbidities were not mutually exclusive, since the same woman could have more than one complication. It is important to note that for the current analysis, we did not limit conditions to those associated with SMM (the presence of WHO criteria for potentially life-threatening conditions [PLTC] and maternal near miss [MNM]), as in the original study; instead morbidity was defined as the current broader concept of maternal morbidity, defined by the WHO Maternal Morbidity Working Group.[11]

3 | RESULTS

The distribution of women included in this analysis is shown in Figure 1. The overall mean value of WHODAS-36 scores among women below the 10th percentile (n=64) was 1.09 (0.94–1.89) and

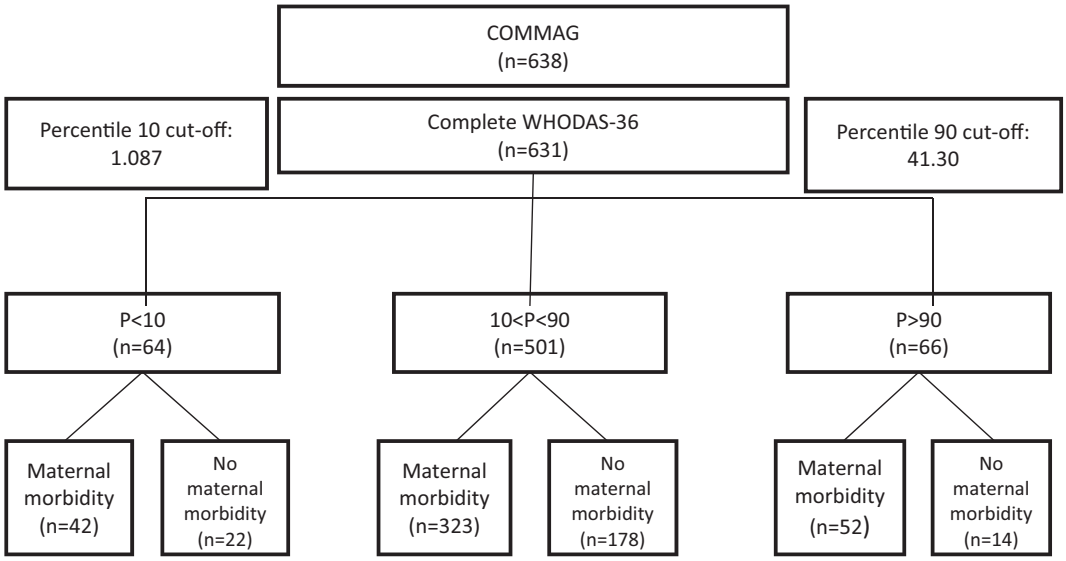

FIGURE 1 Flow chart of the distribution of women among the three percentile groups, according to their scores on the WHO Disability Assessment Schedule (WHODAS) 2.0 36-item tool.

for those in the 90th percentile (n=66) it was 41.30 (36.96–44.52). Considering both groups, women with and without maternal morbidity, there was a nonsignificant trend of high WHODAS scores (P>90) among cases with morbidity (44.6% vs 36.8%; *P*=0.879) (Table 1).

Women who presented with a history of maternal morbidity owing to other complications (in this sample this represented mostly indirect causes of morbidity, especially infection, given the influenza H1N1 outbreak at the time the study was conducted) were significantly more likely to have scores above the 90th percentile (*P*=0.045; Table 2). The distribution of women with hemorrhagic complications across the three percentile groups (P<10, P>90, and 10<P<90) according to WHODAS-36 scores was similar (Table 2). Additionally, we analyzed the incidence of 31 perinatal deaths (4.9% of the overall sample) across the three percentile groups, and found no statistically significant difference between them (7.8%, 4.8%, and 3.3%, respectively; *P*<0.001).

The occurrence of any complication or the presence of any previous medical condition impacted postpartum functioning, as shown in Table 3. Mean scores among women with any complication were higher than those with no morbidity (19.0 ± 16.4 vs 14.2 ± 13.3; *P*=0.01). Higher WHODAS-36 scores were also seen in women who presented with hypertension or other complications during pregnancy, but not for those with hemorrhagic conditions (19.9 ± 16.6 vs 19.4 ± 16.3 vs 13.8 ± 13.8, *P*=0.01).

Each domain of the WHODAS-36 was compared among the different underlying causes of maternal morbidity and results are shown in Table 4. Scores for domains 5 (household activities), 6 (participation), and 1 (cognition) were the most impacted by maternal morbidity, while domain 3 (self-care) was the least affected. However, there was no statistically significant difference among the underlying causes of maternal morbidity across any of the domains.

TABLE 1 WHODAS-36 total score values of percentile 10 (P<10) and percentile 90 (P>90) for women with maternal morbidity and no morbidity.

	P<10	P>90
No.	64	66
Total	1.1 (0.9–1.9)	41.3 (37.0–44.5)
No morbidity[a]	1.9 (1.1–1.9)	36.8 (32.6–42.4)
Maternal morbidity[a]	1.0 (0.0–2.0)	44.6 (39.6–48.3)

[a]Cut-off point for each percentile. Yates χ^2 test used to compare both groups. *P* value for P<10=0.698; *P* value for P>90=0.879.

4 | DISCUSSION

Our study found that maternal morbidity negatively impacted postpartum functioning, especially in women with hypertensive disorders of pregnancy and other indirect causes of maternal morbidity. Measuring health-related functioning is a relatively new concern and WHODAS

TABLE 2 Frequency of complications during pregnancy according to the WHODAS-36 score among three different percentile groups.

Complications	P<10 (n=64) No. (%)	10<P<90 (n=501) No. (%)	P>90 (n=66) No. (%)	*P* value
None	22 (34.4)	178 (35.5)	14 (21.2)	0.069
Any	42 (65.6)	323 (64.5)	52 (78.8)	
Hemorrhage[a]	4 (6.2)	48 (9.6)	3 (4.5)	0.30
Hypertensive disorders[a]	24 (37.5)	168 (33.5)	31 (47.0)	0.09
Other[a,b]	37 (57.8)	293 (58.5)	49 (74.2)	0.045

[a]Categories were not mutually exclusive.
[b]Category included women with: obesity; low weight; diabetes; heart, kidney, or pulmonary diseases; sickle cell anemia; HIV/AIDS; thyroid diseases; neurological diseases/epilepsy; collagenosis; and cancer.

TABLE 3 Mean, median, and standard deviation for WHODAS-36 total score among women with and without complications during pregnancy.

	Median	Mean	SD	*P* value
Complication				0.01
Any (n=417)	14.2	19.0	16.4	
None (n=214)	8.7	14.2	13.3	
Hemorrhage				0.09
Yes (n=55)	9.8	13.8	13.8	
No (n=576)	13.0	17.7	15.7	
Hypertensive disorders				0.004
Yes (n=223)	15.2	19.9	16.6	
No (n=408)	12.0	16.0	14.9	
Other complications				<0.001
Yes (n=379)	15.1	19.4	16.3	
No (n=252)	9.5	14.4	13.9	

is also a relatively new instrument for analyzing it; few studies have used WHODAS among women of reproductive age, with no reports on postpartum women, to the best of our knowledge. Other instruments have been used to assess specific conditions such as depression, psychiatric morbidity, and anxiety.[12–14] WHODAS scores among other groups, such as patients with Huntington's disease or dementia, showed that affected individuals have higher WHODAS-36 scores, approximately three points higher than controls.[15,16]

In our retrospective cohort, we found that there was a statistically significant difference in WHODAS scores between women with and without SMM.[7] However, there are still many gaps in our understanding of such results, as there is no baseline score or threshold to determine the clinical significance of these findings. Hypertension is an important cause of SMM[17] and is responsible for over 70% of our cases of maternal morbidity. Our analysis showed that this condition was related to poor functioning, as expressed in higher WHODAS-36 scores. We can speculate that women with hypertension may experience not only acute complications (placental abruption, pulmonary edema, stroke), but also the need to control blood pressure postpartum (and later in life) and the need to deal with the consequences of premature birth, since there is an increased risk of a medically indicated preterm birth among these women.[18] Most likely, these factors had an impact on functionality. Another study, conducted in Malaysia using a different psychometric tool, showed that women who experienced SMM had lower functional ability 1 month postpartum, but the difference disappeared after 6 months.[19] Unfortunately, we were unable to perform any subanalysis on women with chronic hypertension versus gestational hypertension and pre-eclampsia. The differences in WHODAS scores among these groups should be further explored and might provide an insight into the underlying mechanism of impaired functioning postpartum.

Hemorrhagic complications did not reach significant levels in our WHODAS analysis. However, we cannot draw a definitive conclusion that this type of morbidity does not lead to functional impairment owing to the limited number of cases in our sample. Nevertheless, we could speculate that if hemorrhage were effectively managed, the impact would be short-term until the body re-established hematologic function, whereas our duration of follow-up ranged from 1 to 5 years.

The case definition in our study considered deliveries between 2008 and 2012, which included an outbreak of pandemic H1N1 influenza among pregnant women in our sample. This is reflected in the number of "other morbidities," as an indirect cause of maternal morbidity.[20] Other indirect causes of morbidity are increasing in Brazil as part of the obstetric transition. This phenomenon demonstrates that low- and middle-income countries are experiencing what high-income countries have previously experienced: as direct causes of maternal death and morbidity decrease with the improvement of social and economic conditions, the relative proportion of indirect causes increases.[21,22] Nonetheless, emerging economies such as Brazil must struggle simultaneously with both the diseases of high-income settings (such as cardiac disease and cancer), and those mostly present in low-income settings (such as HIV/AIDS and anemia).[23] Evaluating the impact on functionality according to each setting is important for awareness and for defining public health priorities for women.

A limitation of our study is the broad postpartum period considered (1–5 years). Even though all of our previous analyses have included time since delivery as an independent variable, with no significant differences among them,[10] other factors that we did not account for could have impacted women's WHODAS scores. Future studies should be performed within a narrower postpartum period to address this concern.

The current analysis can guide future studies toward specific morbidities and interventions to prevent disabilities. The study of

TABLE 4 Mean and standard deviation on each domain of WHODAS-36 according to the different groups.

	Hypertensive disorders	Hemorrhage	Others	*P* value
No.	223	55	379	
Domain 1: cognition	22.4 ± 17.8	16.4 ± 13.3	22.2 ± 18.6	0.07
Domain 2: mobility	17.4 ± 21.8	10.2 ± 19.7	16.0 ± 20.2	0.07
Domain 3: self-care	6.5 ± 13.2	4.4 ± 11.1	6.2 ± 13.2	0.57
Domain 4: getting along with people	15.3 ± 21.1	8.8 ± 14.1	15.1 ± 20.5	0.08
Domain 5: household activities	26.3 ± 29.2	18.1 ± 26.5	25.3 ± 28.6	0.16
Domain 6: participation	23.8 ± 21.1	17.0 ± 17.6	23.6 ± 21.6	0.08

long-term consequences of maternal morbidity beyond acute disease (such as increased risk of cardiovascular complications in women with previous pre-eclampsia[24]) is very limited. However, there is a need to address these consequences, because a mother's impairments can impact the whole family and future pregnancies. The findings highlight the need for family health practitioners to incorporate continuing medical care, even after recovery from the acute effects of pregnancy and delivery. WHODAS is a potential tool for this endeavor and may be able to guide interventions in the near future.

Hypertensive and other complications (mostly indirect causes of morbidity), but not hemorrhagic complications, were associated with significantly increased WHODAS-36 scores. Women with hypertensive complications during pregnancy had the highest WHODAS-36 scores. Future studies should establish the normality ranges of WHODAS-36 score in obstetric populations and compare other psychometric scales with WHODAS-36 in these populations.

AUTHOR CONTRIBUTIONS

JPG, MLC, MAP, RCP, ECF, JM, CS, RTS, and JGC had the original idea and developed the analysis plan for the current study. MHS performed statistical analysis. JPG created the figure and tables. JPG, MLC, and JGC wrote the first draft. LS, DC, VF, MB, KB, AMB, and PvD gave important suggestions for the plan of analyses and reviewed the drafts. JPG, MLC, and JGC wrote this version of the article, which was read and approved by all authors.

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CONFLICTS OF INTEREST

The authors declare that they have no conflict of interest.

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