

# What words best capture the symptom of breathlessness in Uganda?

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## ABSTRACT

**Introduction:** Anecdotal experience suggests that Ugandan patients complain infrequently of breathlessness. The Luganda language, spoken in Uganda, does not have one word to express breathlessness but uses various phrases. Therefore, many of these patients may not be able to express what they feel when they are breathless by a single English word. Our aim was to determine the frequency and severity of the symptoms captured by a Luganda translation of the Dyspnea-12 (D12) questionnaire, a well validated measure of different dimensions of breathlessness.

**Method:** All alert non-pregnant adult patients fluent in Luganda who presented to the hospital's combined outpatient and emergency department were asked to complete the D12 questionnaire.

**Results:** Out of 466 patients, 137 (29.4%) had at least one D12 symptom. Patients' D12 responses expressed as a numerical severity score was only weakly associated with a respiratory rate >20 bpm. Two questions ("My breathing requires more work" and "My breathing is uncomfortable") identified >90% of patients likely to be breathless.

**Conclusion:** For patients whose first language is Luganda a translation of the D12 questionnaire captures the symptom of dyspnoea.

**Key words:** breathlessness; dyspnoea; respiratory rate; cardiopulmonary disease; Luganda

## INTRODUCTION

Dyspnoea or breathlessness is a common symptom strongly associated with cardiorespiratory diseases and mortality, which can affect up to half of all acutely ill patients admitted to hospital and a quarter of ambulatory patients.<sup>[1]</sup> However, during the introduction of a modified South African Triage System,<sup>[2]</sup> 4,340 patients presenting to Kitovu Hospital, Uganda were asked if they were breathless; only 88(2%) said they were.

Although many patients attending the Kitovu Hospital understand English, it is not the first language of most. Breathlessness is not a single sensation, and not all languages use a single word to describe it and may use several different words, such as air hunger, tightness, or a sensation of work or effort.<sup>[3]</sup> If patients are not asked questions they fully comprehend and capture what they are experiencing, then the symptom will be under-recognized and poorly managed.<sup>[4]</sup> The Luganda or Ganda language, spoken by more than 10 million people in central Uganda, expresses breathlessness by various phrases. The Dyspnea-12 (D12) questionnaire<sup>[5]</sup> was developed to measure different dimensions of breathlessness and has been validated in several languages and cardiorespiratory diseases.<sup>[6]</sup>

The aim of this study was to determine the frequency and severity of the symptoms captured by a Luganda language translation of the D12 questionnaire in alert consenting patients presenting to Kitovu Hospital.

## METHOD

This prospective observational study, which is part of an ongoing quality improvement audit, was performed in the combined emergency and outpatient department of Kitovu Hospital, a low resource hospital located near Masaka, Uganda, 140km from the capital city of Kampala. It is a private not-for-profit (PNFP) hospital, accredited by the Uganda Catholic Medical Bureau.

Participants were all alert non-pregnant adult patients (i.e., >12 years of age) fluent in Luganda who presented to the hospital's combined outpatient and emergency department between 13th and 31st August 2022 between 8 am and 5 pm who verbally consented to participate. A dedicated researcher entered patients' age, sex, respiratory rate, oxygen saturation, heart rate and responses to each of the twelve symptoms of the D12 questionnaire<sup>[5]</sup> into an Excel database (Version 2102, Microsoft Corp., Redmond, WA). The D-12 questionnaire was translated

into Luganda by JV, HK and IN and validated by several native speakers (Table 1).

The severity of each itemised symptom was ranked numerically as: asymptomatic = 0; mild symptom = 1; moderate =2; severe = 3 points. Therefore, the minimum D12 severity score was 0 points and the maximum 36 points. Respiratory rate was measured using the RRate smartphone application,<sup>[7]</sup> and oxygen saturation and heart rate by a Handheld Pulse Oximeter available from Shenzhen YKD Technology CO., Ltd (<https://www.ykdmedical.com/products/fingertip-pulse-oximeter/handheld-pulse-oximeter/>)

Descriptive statistics were performed using Epi-Info version 6.0 (Centre for Disease Control and Prevention, USA). Odds ratios were determined using the Yates correction to demonstrate the association between the D-12 questionnaire and its components with tachypnoea and hypoxia; tachypnoea was defined as a respiratory rate >20 breath per minute and hypoxia as an oxygen saturation below 96%, in accordance with the criteria of the UK National Early Warning Score.<sup>[8]</sup> The p-value for statistical significance was 0.05.

**Table 1. Dyspnoea-12 questionnaire translated into Luganda**

Question number	Symptom
1	My breathing does not go in all the way Okussa kwange tekuyingira mu mawuggwe
2	My breathing requires more work Okussa kwange kwetaaga okukola ennyo
3	I feel short of breath Mpulira nga nfuuwa omukka
4	I have difficulty catching my breath Nzibuwalira okukwata omukka
5	I cannot get enough air Sisobola kufuna mpewo emala
6	My breathing is uncomfortable Okussa kwange tekunyuma
7	My breathing is exhausting Okussa kwange kunkooya
8	My breathing makes me feel depressed Okussa kwange kundeetera okwenyamira
9	My breathing makes me feel miserable Okussa kwange kunfuula ow'ennaku
10	My breathing is distressing Okussa kunnyigiriza
11	My breathing makes me agitated Okussa kwange kundetera okwekyanga
12	My breathing is irritating Okussa kwange kunnyiiza

## Ethics

Ethical approval of the study was obtained from the Scientific Committee, Kitovu Hospital. The study conforms to the principles outlined in the Declaration of Helsinki.

## RESULTS

Of the 466 patients who consented to participate, only 14 (3.0%) were admitted to hospital, none of whom died while in hospital. The mean age of the participants was 43.5, SD 19.4 years, and 291 (62.4%) were female; their mean respiratory rate was 19.8, SD 4.8 breaths per minute, their heart rate 80.2, SD 17.0 beats per minute, and their mean oxygen saturation 96.6%, SD 5.2%.

The mean total D12 score was 4.5, SD 8.3, and 137 (29.4%) patients were symptomatic (i.e., scored more than zero points). Symptomatic patients were older than those who were asymptomatic (46.7 SD, 21.5 versus 42.2, SD 18.3 years,  $p$  0.02) and had a higher mean respiratory rate (21.3, SD 6.3 versus 19.2, SD 3.8 breaths per minute,  $p$  <0.0001), but did not have significantly different heart rates (80.9, SD 16.9 versus 79.8, SD 17.0 beats per minute,  $p$  0.57) or oxygen saturation (96.8%, SD 4.5% versus 96.5%, SD 5.5%,  $p$  0.58)

The number of patients who were symptomatic for each of the itemized questions of the D12 questionnaire ranged from 120 (25.6%) for Question 6 to 75 (16.1%) for Question 11 (Figure 1). By a process of trial and error the following combinations of questions were found to

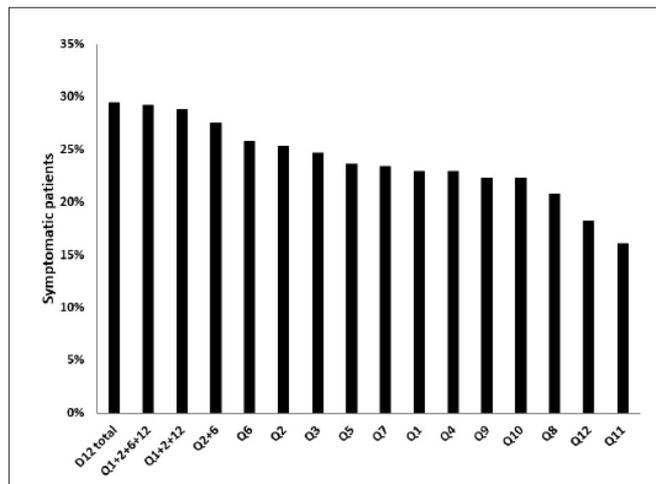


Figure 1. Percent of patients who were symptomatic for the total D12 questionnaire, each of the itemized questions of the questionnaire, and selected combinations of questions. Q1 = question 1, Q2 = question 2, etc.

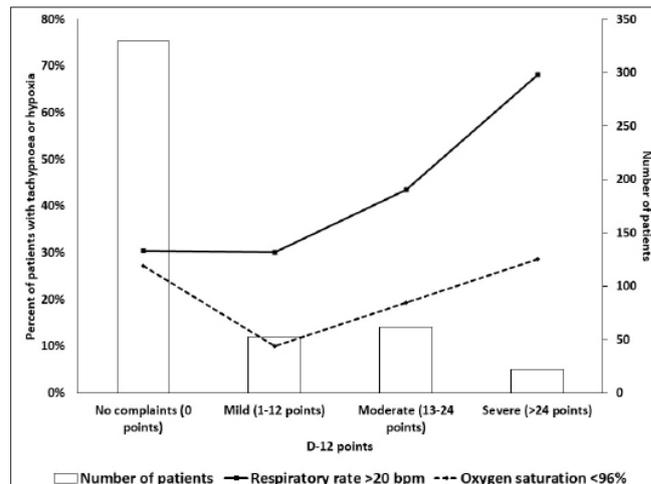


Figure 2. Number of patients and percent with hypoxia (i.e., oxygen saturation <96%) and tachypnoea (i.e., respiratory rate >20 breaths per minute) according to the D-12 points score

Table 2. The number of patients complaining and the proportion with a respiratory rate >20 breaths per minute for each item of the D12 questionnaire according to severity

D12 question	Number of patients (percent with respiratory rate >20 breaths per minute)			
	No complaint (zero points)	Mild (1-12 points)	Moderate (13-24 points)	Severe (>24 points)
Q1	359 (31.2%)	70 (32.9%)	36 (61.1%)	1 (100.0%)
Q2	348 (30.5%)	55 (25.5%)	55 (56.4%)	8 (87.5%)
Q3	351 (30.2%)	49 (38.8%)	45 (42.2%)	21 (66.6%)
Q4	359 (30.1%)	40 (35.0%)	50 (44.0%)	17 (82.4%)
Q5	356 (29.8%)	49 (32.7%)	45 (53.3%)	16 (75.0%)
Q6	346 (29.8%)	43 (25.6%)	56 (51.8%)	21 (71.4%)
Q7	357 (30.3%)	51 (47.1%)	54 (42.6%)	4 (75.0%)
Q8	369 (30.9%)	42 (28.6%)	44 (54.5%)	11 (72.7%)
Q9	362 (30.9%)	39 (33.3%)	40 (42.5%)	25 (64.0%)
Q10	362 (30.4%)	36 (33.3%)	39 (56.4%)	29 (48.3%)
Q11	391 (30.9%)	45 (51.1%)	24 (54.2%)	6 (16.7%)
Q12	381 (31.2%)	40 (40.0%)	33 (48.5%)	12 (58.3%)

identify the most patients with more than zero D12 points: Question 2 +6 identified 128 (27.5%) patients, Question 1 + 2 + 12 identified 134 (28.8%), and Questions 1 + 2 + 6 + 12 identified 136 (29.2%) (i.e., one less patient than the total D12 score).

Out of 329 asymptomatic patients (i.e., scored zero D12 points) 100 (30.4%) had tachypnoea (i.e., a respiratory rate >20 bpm); the proportion of patients with tachypnoea increased with the D12 points score and the odds ratio for tachypnoea in a symptomatic patient was 1.68 (95% confidence interval 1.09 – 2.60, p 0.02); similar patterns were observed for all the 12 itemized symptoms of the D12 score (Table 2).

In contrast, the odds ratio for hypoxia (i.e., oxygen saturation below 96%) in symptomatic patients was negative at 0.56 (95% confidence interval 0.32 – 0.97, p 0.04) as there was a U-shaped relationship between hypoxia and D-12 points (Figure 2).

## DISCUSSION

### Main findings

This study found that more than a quarter of patients presenting to a low resource hospital in Uganda had at least one of the symptoms itemised by the D12 questionnaire, which is a well validated measure of breathlessness.<sup>[6]</sup> These findings suggest that if asked using language that patients understand, breathlessness is as common in acutely ill Ugandan patients as it is elsewhere in the world.

### Interpretation

Breathlessness has been described as a polymodal sensation, which comes from muscle and tendon tension in the respiratory muscles in the chest and neck, the feeling of skin pressure over the stomach as it fails to rise on inhalation, and gastrointestinal tract distension if the abdomen becomes distended, preventing normal inhalation.<sup>[9]</sup> It is not surprising that different cultures and languages may choose different words to describe these mixed sensations. Clinicians should be aware that ethnic differences may exist in the words used to describe breathlessness. For example,

asthmatic African Americans use primarily upper airway words to describe their breathlessness, whereas whites used lower airway or chest-wall descriptors.<sup>[10]</sup> Therefore, our findings may be relevant to other patient populations outside of Uganda.

### Clinical relevance

Although only 3.0% of the patients in this study were admitted to hospital and none died, 34% had a respiratory rate >20 bpm, 24% an oxygen saturation <96%, and 11% a heart rate >100 bpm. Therefore, it is likely that many of these patients had significant cardiopulmonary disease. Failure to recognise that a patient is breathless may result in a serious life-threatening cardiopulmonary diagnosis being overlooked.<sup>[4]</sup> Although asking all the D12 questions during emergency care may not be practical, this study shows that asking questions 2 and 6 identified >90% of patients likely to be breathless.

Dyspnoea, tachypnoea, and hypoxia are all associated with mortality.<sup>[1,8]</sup> However, there was a weak association between the patients' D12 responses expressed as a numerical severity score and respiratory rate, and more than 30% of patients without D12 symptoms were tachypnoeic and 27% hypoxic. Counterintuitively, patients without symptoms were more likely to be hypoxic, which suggests the sensation of dyspnoea may be part of a physiologic response to improve oxygen saturation. Therefore, breathlessness, respiratory rate, and oxygen saturation levels must each be assessed in acutely ill patients, as a normal value for one cannot imply normal values for either of the other two.

### CONCLUSION

For patients whose first language is Luganda a translation of the D12 questionnaire, unlike the single English word breathlessness, captures the symptom of dyspnoea. Between two and four questions identify dyspnoea nearly as well as the entire questionnaire.

**Limitations:** This study was performed in a single centre and did not consider patients' diagnoses or their follow-up after discharge.

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translated the Dyspnoea-12 questionnaire into Luganda.

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