How long is a normal labour? Contemporary patterns of labour and birth in a low risk sample of 1612 women from four Nordic countries

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Abstract

Objective: Normal progress of labour is a subject for discussion among professionals. The aim of this study was to assess the length of labour in women with a planned home birth and spontaneous onset who gave birth at home or in hospital after transfer.

Methods: This is a population-based study of home births in four Nordic countries (Denmark, Iceland, Norway and Sweden). All midwives assisting at a home birth from 2008-2013 were asked to provide information about home births using a questionnaire.

Results: Birth data from 1612 women, from Denmark, (n=1170), Norway (n=263) Sweden (n=138), and Iceland (n=41) was included. The total median length from onset of labour until the birth of the baby was approximately 14 hours for primiparas and 7.25 hours for multiparas. The length of the different phases varied between countries. Blood loss > 1000 ml and perineal ruptures that needed suturing were associated with a longer pushing phase and the latter with country of residence, parity, single status and the baby's weight.

Conclusion: In this population of healthy women with a low prevalence of interventions the total length of labour was fairly similar to what is described in the literature for multiparas, but longer for primiparas. Although the length of the phases of labour differed among countries, it was to a minor extent associated with severe outcomes.

Keywords: Length of labour, physiological birth, phases of labour, country of birth, home birth

Word count: 3114

Introduction

Normal progress of labour is a subject for discussion among professionals. In modern obstetrics it can be difficult to monitor, manage and evaluate the course of a normal birth due to the high use of technology and hospital routines, which could affect the length of labour.

Factors associated with the length of the various stages of labour include maternal characteristics, such as age (1-2), parity (3-5), maternal body mass index (BMI) (6-8), the baby's weight (9) and position (10).

In textbooks for midwives the length of the first stage of labour in primiparas were described as 12-14 hours, and 6-10 hours for multiparas, with the latent phase being 6.5 hours and 5 hours respectively. The second stage lasts around 60 versus 30 minutes respectively and the third stage ranges from 5 to15 minutes if active management is applied. The childbirth process is usually described in terms of phases where the 1st stage is divided into a latent phase which is characterized by a slow rate of cervical dilation and effacement with contractions that can be irregular in both strengths and frequency, and an active phase (regular contractions, cervical dilatation >4cm up to fully dilatation). The descending phase (from fully dilatation to start of pushing) is not often described. The 2nd stage of labour involves the pushing phase until the birth of the baby (11).

The progress of labour is often documented using a partogram aiming for early detection of a slow progress and preventing a normal labour to change to a prolonged labour (12). The most common partogram was developed in 1954 by Friedman, on a sample of 100 nulliparous women (13), but its usefulness has been questioned due to changes in the pregnant population (14). In a recent study consisting of 62,415 women in the US, with singleton term pregnancies, spontaneous onset and normal perinatal outcome Zhang and co-workers (5) reported that the cervical dilatation from four to five cm could take more than six hours, but was fairly similar among primiparas and multiparas, with a faster acceleration in multiparas after six cm of dilation. The authors recommended a specific partogram for primiparas. The study is, however, compromised of a US sample, including only hospital births, with some women receiving oxytocin augmentation and epidural analgesia and only time after hospital admission was recorded. Despite the widespread use of partograms a recent Cochrane review consisting of 7706 women with spontaneous onset of labour, concluded that there is limited evidence of the effect of partogram use on the levels of caesarean section, instrumental vaginal births or the Apgar score (13).

Since the 1950s, demographic changes have also occurred in the Nordic women, such as the trend to postpone pregnancies (16) and the increase in body mass index (BMI) (17). Still, hospital routines when monitoring the progress of labour, are very much based on previously developed partograms. Similar to the findings reported by Zhang et al. (5) and Lavender et al., (13) it is difficult to assess the length of a normal birth in the Nordic countries due to the common use of induction or augmentation of labour, use of epidural analgesia and guidelines proposing time limits for pushing.

The majority of births in Nordic countries take place in hospitals. Some women, however, chose to give birth at home with the assistance of a midwife. The prevalence of home births in Denmark is 12/1000 births, in Iceland 18/1000 births, in Norway 1.9/1000 and in Sweden 0.6/1000 births (17). Women who give birth at home usually do so without any interventions. Therefore, this population would be optimal for studying the length of a normal labour and birth. The context of birth differs among the Nordic countries depending on the available options of the place of birth. In Denmark, home birth is included in the public health system; in Norway and Iceland home birth is financed through taxes, but with varied access to midwifery assistance. In Sweden, women who opt for a home birth need to find a midwife willing to assist and usually women have to pay for the home birth themselves (17). Despite the fact that the organization of home birth care differs among the Nordic countries, the population is fairly similar in terms of health, and all Nordic countries have equal access to health care. Nordic women who chose to give birth at home are selected to be a low risk population and midwives are the primary care givers during pregnancy, birth and the post-partum period (17).

Given the recent changes in the birth giving population and the increase in birth interventions in hospitals, information about contemporary length of labour during a normal birth is insufficient. The aim of this study was to assess the length of labour in women with a planned home birth and spontaneous onset who gave birth at home or in hospital after transfer.

Method

Design

A population based study of home births in four Nordic countries.

Procedure

All midwives assisting at a home birth in the Nordic countries during the years 2008-2013 were asked to provide information about all home births. The questionnaire was similar in all countries and distributed by the contact person in each country. In Norway the contact person collected all data, in Sweden, Denmark and Iceland the information was collected using a web-based questionnaire.

Sample

Originally data from 3068 women were entered into the online database. For the purpose of this study a selected sample of women included those who had a planned home birth with spontaneous onset of labour, vertex presentation and where all phases of labour and birth were recorded. The reason for this was to have a sample as normal as possible. Women who were transferred to hospitals were included if they had a normal vaginal birth, without oxytocin augmentation, epidural analgesia or instrumental vaginal birth.

Questionnaire

The questionnaire included information about the women's background characteristics (country of residence, age, parity, civil status, body mass index, tobacco use). Information about, place of birth (home, during transfer, hospital), and birth outcome were reported one week after the birth.

Length of labour and birth were assessed in minutes and hours for the latent phase, the active phase, the descending phase and the pushing phase. The phases were defined in accordance with literature with the exception of centimeters of dilatation. Time for onset of labour included the woman's own perception of when labour started. These phases were added to form a total length of labour and birth. The third stage of labour was presented as a single item. The outcome variables were blood loss >1000 ml, perineal ruptures sutured (grade I-II), OASIS, and episiotomies.

Analysis

Descriptive statistics were used to present the background characteristics of the sample. Due to the non-normal distribution of the different phase of labour medians with the 10^{th} and 90^{th}

percentiles were used to present the length of the different phases of labour. Chi-square test and Kruskall-Wallis test were used to study differences between countries (18). Finally, logistic regression modelling was performed to explore which factors contributed most to blood loss>1000 ml and perineal trauma sutured. All phases of labour (in hours) and background characteristics of women were entered simultaneously in the models and thereafter removed one by one until only statistically significant variables remained.

Results

Description of the sample

In total, birth data from 1612 women were included after the exclusion of questionnaires where any of the following were present epidural analgesia (74), caesarean section (48), instrumental vaginal birth (28) or oxytocin augmentation (152) or where the baby was in a breech position (7). Additionally, data from 1269 births were excluded because not all phases of labour were recorded. The majority of women came from Denmark, (1170), followed by Norway (n=263), Sweden (n=138), and Iceland (n=41). The mean age for the total sample was 32 years (range 21-44), married or cohabiting (98.5%), and non-smoking (92%). The majority were multiparas (82%) and 43% had given birth to their second child. An overview of the study sample by country is presented in Table 1. All background variables showed a statistically significant difference between the countries. Iceland had the youngest mothers and Sweden the oldest. Few women used tobacco, with the exception of Denmark where 10% women were smokers. Icelandic women had the highest body mass index.

Length of the different stages of labour and birth

Table 2 shows the length in the various stages of labour and birth. The median length in hours for the latent phase was around four hours and the active phase just under three hours. In general, it took nearly 20 minutes for the baby to descend and the pushing phase was 20 minutes. All stages were significantly shorter in multiparas. The total median length from onset of labour until birth of the baby of around 14 hours for primiparas and 7.25 hours for multiparas. There was a clear dose-response effect in total length of labour between giving birth to the first and second baby (median difference 6.03), between second and third baby (median difference 1.07) and between the third and four or more babies (median difference 0.33) (data not shown in table).

Differences in length of labour among the Nordic countries

The phases of labour were further explored according to parity and country of birth (Table 3) and showed significant differences by the country of residence, where Icelandic women had the longest total length of labour and Norway the shortest (Figure 1). For primiparas there were no difference between the countries in the latent phase, but in all the other phases. In general, both primiparous and multiparous women followed the same pattern.

Birth outcome in relation to length of labour

OASIS and episiotomies were rare, with 0.5% (n=8) and 0.7% (n=11) respectively. Perineal ruptures grade I-II that needed suturing was reported for 43% of the sample. Blood loss > 1000 ml was found in 1.4% of the women.

In logistic regression models the impact of labour phases, and background characteristics were studied in order to retain factors most important for perineal ruptures sutured and blood loss >1000 ml. All explanatory variables were entered and removed one by one until only statistically significant variables remained. The only phase of labour significantly associated with ruptures in need of suturing were the length of the pushing phase. In addition living in Denmark and Iceland, primiparity, being single, a baby weighing more than 3600 gram were associated with an increased risk for perineal ruptures in need of suturing. Women living in Sweden were less likely to need suturing (Table 4).

The only variable associated with blood loss > 1000 ml was the length of the pushing phase (h), but no other phases of labour, or background characteristics were associated with great blood loss (Table 4).

Discussion

The main findings of this study are that in low-risk Nordic women with a planned home birth, the total length of labour from onset to the birth of the baby fairly similar than previously reported. Background differences among the four Nordic countries were found. Parity and country of residence were two variables affecting the median length of the phases. The length of the pushing phase of labour were associated with large blood loss and perineal ruptures that needed suturing. In addition, perineal ruptures in need of suturing were also associated with parity and country of residence.

In this study, firstly, we found that women in Nordic countries who planned for a home birth seem to give birth within the normal scope of labour, but a bit longer than described in the literature (11,12). In the Swedish textbook for obstetricians (12) the mean length for primiparas is estimated to be 12 hours and for multiparas 8 hours. In the present study, and its non-interventionist context, the median length for primiparas was nearly 14 hours and for multiparas around 7.5 hour. However, not all literature takes into account the latent phase or the descending phase of labour. Another issue in clinical practice is that partograms do not always take into account the length of the latent phase, as women are encouraged to stay out of hospital during this stage. A review regarding diagnosis and management in the latent phase of labour, concludes that determining the time of onset of labour is a source of frustration for both clinicians and researchers, who, therefore, avoid calculations of the latent phase (19). In the present study, women self-reported the onset of labour to the midwife. This is also the normal case in hospital births and the exact definitions of the phases could deviate from the truth. However, there is no way to check the accuracy of a subjective experience.

Sandall et al (20) have previously reported that women who received midwife-led care had shorter labours compared with women who were cared for in other models. Although the women in our study received continuous care and in most cases from a midwife they knew before onset of labour, this did not seem to affect the length of labour. However, with this detailed information it is possible to compare the duration of each phase of labour for primiparas and multiparas in physiological births. We found a clear dose-response effect for parity. The number of previous children was associated with all phases of labour; longest for primiparas and shortest for women giving birth to the fourth baby or more. The largest effect was found between the first and the second baby. In line with the findings from Zhang (5) primiparas and multiparas differed with regard to total length of labour. The fact that the duration of each phase was also longer for primiparas supports the request for different partograms for primi- and multiparas.

Surprisingly, the results showed differences between the Nordic countries with regard to background variables and also to length of labour. This is probably not due to any biological differences.

Swedish midwives reported the longest total length of labour for primiparas and the longest duration of latent and descending phases. Icelandic midwives assisting home birth, on the other hand, reported longer duration for multiparas for the majority of the phases of labour.

Sweden differs from the other included countries with regard to organization, the presence of guidelines and funding for planned home births. In Sweden no guidelines for home birth are available. The woman has to pay privately for the midwives' service whereas in the other countries this is included in the health care system (17). In the capital area of Sweden multiparas could gain some allowance for a home birth if they fulfil the criteria mentioned above, but primiparas are advised not to give birth at home (17). The lack of guidelines seems to affect the transferal rates in planned home birth; i.e., lower rates of transfers from home to hospital can be seen in countries where there are no guidelines regulating the care in planned home births (21). It could be assumed that the marginalization of home birth as an alternative plays a role regarding care during labour and the tolerance for individual differences. Another interpretation of the differences among the Nordic countries could be the accuracy in documentation, which we are not able to control. All home birth midwives were asked to report home birth data, based on the same protocol. However, due to differences in organization this could not have been done differently.

Length of labour phases and birth outcome

Blood loss >1000 ml was found in 1.4% of the women in the present study and was associated with a longer pushing phase, e.g for every hour of pushing, the odds for large blood loss increased with around 70 %. In this sample of low risk women. All of the 18 women with great blood loss were multiparas. Studies have primarily focused on the length of the second stage and primiparas in relation to severe blood loss. A French study (22) reported a prevalence of blood loss >1000 ml to 2.1% in a hospital based study on a low risk population. They divided the second stage into a passive (similar to the descending phase) and an active phase. The risk for severe blood loss occurred when the active stage exceeded 40 minutes and the authors recommended delayed pushing as prevention. This is also recommended as 'best practice' for the second stage of labour (23).

The prevalence of severe perineal injuries such as OASIS was low in the present study (0.5%). These figures are fairly similar to those previously reported in a national Swedish home birth study that showed 0.3% OASIS (24) and in a study from Norway on planned home births who found 0.6% OASIS (25). Contrary to this an Icelandic study where data from 307 home births were collected during 2005-2009 and compared with 921 hospital births, the prevalence of OASIS were 2.6% and 2.9% respectively (26). In the present study, no cases of

OASIS were found in women giving birth in Iceland. In all, the prevalence of OASIS is much lower than the national statistics from Sweden, Denmark and Norway (2.3-4.2%) (27).

Episiotomies were also few (0.7%), fairly similar to the 1% reported in the Swedish national home birth study (24), but lower than the Norwegian study with 4.3% (25) and the previously mentioned Icelandic study (4.3%), (26).

It has been suggested that a slow controlled birth of the baby's head is fundamental for the protection of the perineum (28). The slow birth and the communication between the woman and the midwife in the home birth context might explain the low prevalence of OASIS in this study. The association between the pushing phase and perineal trauma that needed suturing, suggest that it is important not to start pushing to soon (25). The finding that giving birth at home in Sweden was associated with lower odds of suturing is probably due to individual midwives philosophy or organization of care, or the lack of guidelines.

This study is compromised by the observational design, which limited the number of recorded births. Another limitation is that midwives in four countries participated in the data collections. Using the same protocol would have limited the classification bias, and we have no reason to believe that the midwives would have reported these data different to hospital births. There could, however, be contextual or attitudinal differences between the midwives or the countries that we are not aware of. The strength of the study is the detailed description of the different phases of labour, the fairly large material and the input from the Nordic countries.

Conclusion

Length of labour in this low-risk population of Nordic women with a planned home birth showed a detailed description of the phases and associated factors. In this population with a low prevalence of interventions the total length of labour was fairly similar for multiparous women compared with what is described in the literature, but somewhat longer for primiparas. The length of labour varied between the Nordic counties but were only to a minor extent associated with severe outcomes.

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Table 1. Background characteristics of 1612 women with a planned home birth, in four Nordic countries 2008-2013

	Norway n=263 n (%)	Sweden n=138 n (%)	Denmark n=1170 n (%)	Iceland n=41 n (%)	Chi2test p-value
Socio-demographic background					
Age groups					
<25 years	10 (3.8)	10 (7.4)	79 (6.8)	5 (12.2)	
25-35 years	172 (65.9)	76 (55.9)	778 (66.8)	29 (70.7)	
>35 years	79 (30.3)	50 (36.8)	307 (26.4)	7 (17.1)	0.023
Civil status					
Married/cohabit	258 (98.9)	132 (98.5)	1156 (98.8)	40 (97.6)	
Not married/cohabit	3 (1.1)	2 (1.5)	14 (1.2)	1 (2.4)	0.032
Tobacco use					
Yes	6 (2.3)	2 (1.5)	117 (10.3)	2 (4.9)	
No	255 (97.7)	134 (98.5)	1024 (89.7)	39 (95.1)	0.000
Number of children					
First baby	44 (16.7)	22 (15.9)	201 (17.7)	19 (46.3)	
One previous child	96 (36.5)	70 (50.7)	495 (43.6)	14 (34.1)	
Two previous children	82 (31.2)	34 (24.6)	317 (27.9)	7 (17.1)	
Three or more previous children	41 (15.6)	12 (8.7)	123 (10.8)	1 (2.9)	0.001

Body Mass Index					
Mean (SD)	23.75 (3.49)	22.46 (3.56))	23.45 (3.85)	24.97 (4.93)	0.001
BMI-groups					
<18.5	8 (3.4)	6 (5.1)	40 (3.5)	0	
18.5-24.9	158 (66.4)	91 (77.1)	791 (70.1)	24 (63.2)	
25.0-25.9	57 (23.9)	14 (11.9)	222 (19.7)	9 (23.7)	
>30	15 (6.3)	7 (5.9)	75 (6.6)	5 (13.2)	0.194

Table 2. Length of labour phases presented as median values, with 10th and 90th percentile

	Length in hours		**Primiparas**		**Multiparas**	
	All women		**Length in hours**		**Length in hours**	
	md	10th-90th percentile	md	10th-90th percentile	md	10th-90th percentile
Latent phase	4.00	0.50-13.50	6.00	2.00-18.32	3.5	0.29-12.00
Active phase	3.00	1.00-7.00	5.00	2.11-9.50	2.75	1.00-6.00
Descending phase	0.16	0.00-1.00	0.50	0.08-2.00	0.16	0.00-0.78
Pushing phase	0.16	0.05-0.75	0.58	0.16-1.33	0.15	0.05-0.41
Total length	8.31	3.00-19.98	13.76	7.57-26.47	7.25	2.75-17.78
Third stage	0.21	0.10-0.58	0.25	0.1-0.66	0.21	0.10-0.56

Table 3. Comparison of labour phases in 1612 women with planned home birth in four Nordic countries 2008-2013

	Latent phase Md (10^{th}-90^{th} percentile)	**Active phase** Md (10^{th}-90^{th} percentile)	**Descending phase** Md (10^{th}-90^{th} percentile)	**Pushing phase** Md (10^{th}-90^{th} percentile)	**Total length from onset of labour to birth** Md (10^{th}-90^{th} percentile)
All women					
Country					
Norway (n=263)	3.00 (4.00)	3.00 (2.50)	0.16 (0.50)	0.16 (0.25)	7.25 (7.33)
Sweden (n=138)	4.00 (6.63)	3.50 (4.00)	0.33 (0.79)	0.25 (0.45)	9.92 (10.99)
Denmark (n=1170)	4.00 (6.00)	3.00 (2.83)	0.16 (0.42)	0.16 (0.25)	8.32 (8.51)
Iceland (n=41)	6.50 (11.67)	6.33 (4.92)	0.25 (0.58)	0.55 (0.81)	15.48 (11.60)
p-value	0.001	0.000	0.000	0.000	0.000
Primiparas					
Country					
Norway (n=44)	5.00 (0.62-11.00)	5.00 (1.29-9.75)	0.50 (0.0-1.5)	0.54 (0.16-1.25)	12.00 (3.87-19.37)
Sweden (n=22)	7.00 (2.30-22.20)	6.29 (2.57-11.70)	1.00 (0.38-4.55)	0.91 (0.19-3.46)	16.04 (10.19-33.72)
Denmark (n=201)	6.75 (2.00-19.56)	5.00 (2.18-9.00)	0.50 (0.08-2.00)	0.56 (0.16-1.20)	13.73 (7.57-28.46)
Iceland (n=19)	6.50 (0.00-24.00)	7.05 (3.50-12.75)	0.46 (0.08-1.50)	0.91 (0.31-2.08)	15.48 (6.81-37.18)
p-value	0.106	0.033	0.001	0.006	0.011
Multiparas					
Country					
Norway (n=219)	3.00 (0.00-12.00)	2.66 (1.00-5.50)	0.10 (0.00-1.00)	0.16 (0.06-0.50)	6.50 (2.41-16.58)
Sweden (n=116)	4.00 (0.48-16.00)	3.00 (1.00-8.57)	0.25 (0.03-1.27)	0.20 (0.08-0.66)	8.32 (3.28-21.41)
Denmark (n=947)	3.50 (0.50-12.00)	2.66 (1.00-6.00)	0.16 (0.01-0.66)	0.13 (0.05-0.35)	7.26 (2.76-17.50)
Iceland (n=22)	7.04 (0.06-29.03)	4.41 (1.34-9.87)	0.21 (0.06-1.13)	0.41 (0.11-1.46)	15.15 (3.20-35.93)

p-value	0.013	0.006	0.000	0.000	0.000

Table 4. The most important factors that could explain perineal ruptures being sutured and blood loss >1000 ml in 1612 women with planned home births in four Nordic countries

	Perineal ruptures being sutured Odds ratio (95% CI)	Blood loss >1000 ml Odds ratio (95% CI)
Pushing phase	1.48 (1.1-2.00)**	1.71 (1.22-2.40)**
Country		
Norway	1.0 Ref.	
Sweden	0.50 (0.30-0.81)**	
Denmark	1.36 (1.02-1.87)*	
Iceland	2.61 (1.22-5.57)*	
Single status	0.27 (0.09-0.82)*	
Baby weight		
<3600 gram	1.0 Ref.	
3600-4000 gram	1.50 (1.11-2.03)*	
>4000 gram	1.54 (1.14-2.09)*	
Primiparity	3.01 (2.19-4.14)***	

*p<0.05, **p<0.01, ***p<0.001

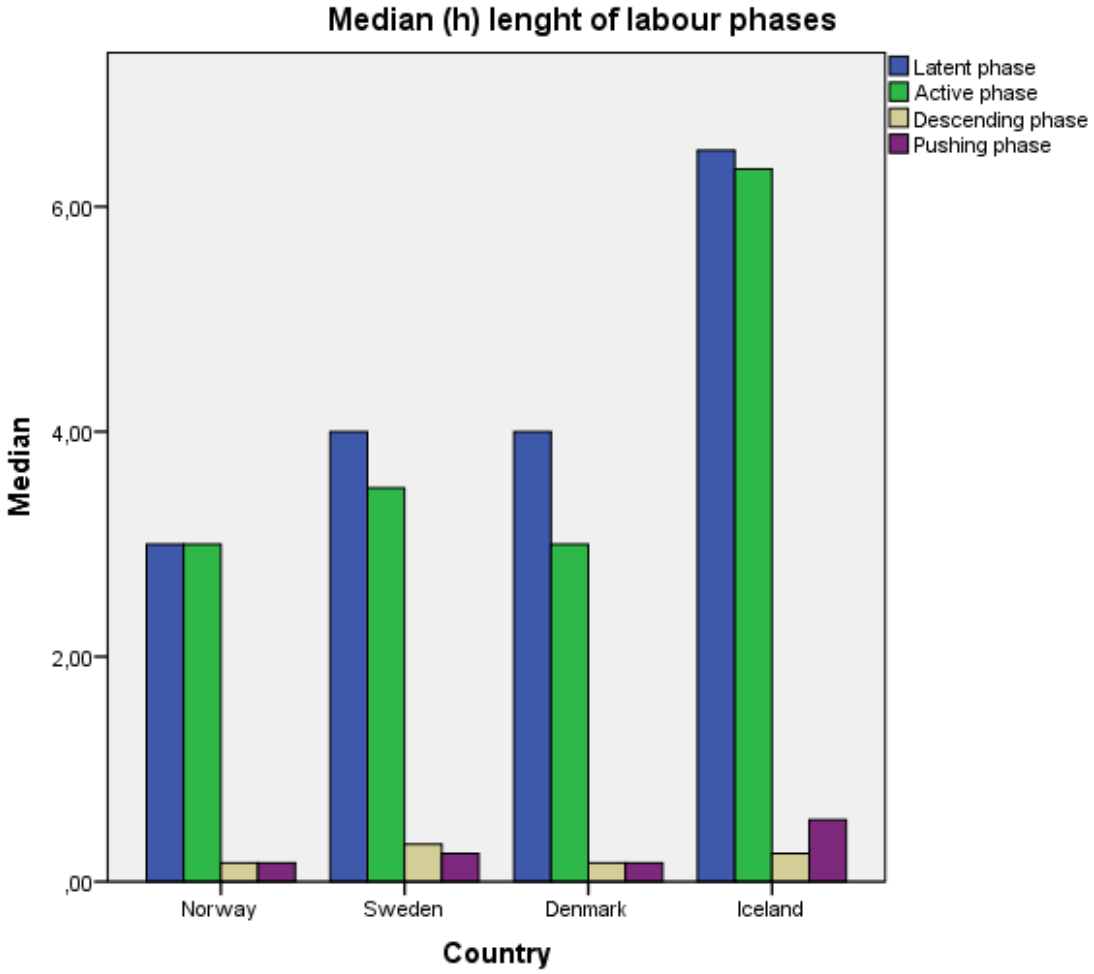
Median (h) lenght of labour phases
Latent phase
Active phase
Descending phase
Pushing phase
Median
6,00
4,00
2,00
,00
Norway
Sweden
Denmark
Iceland
Country

Figure 1. Median length of labour phases

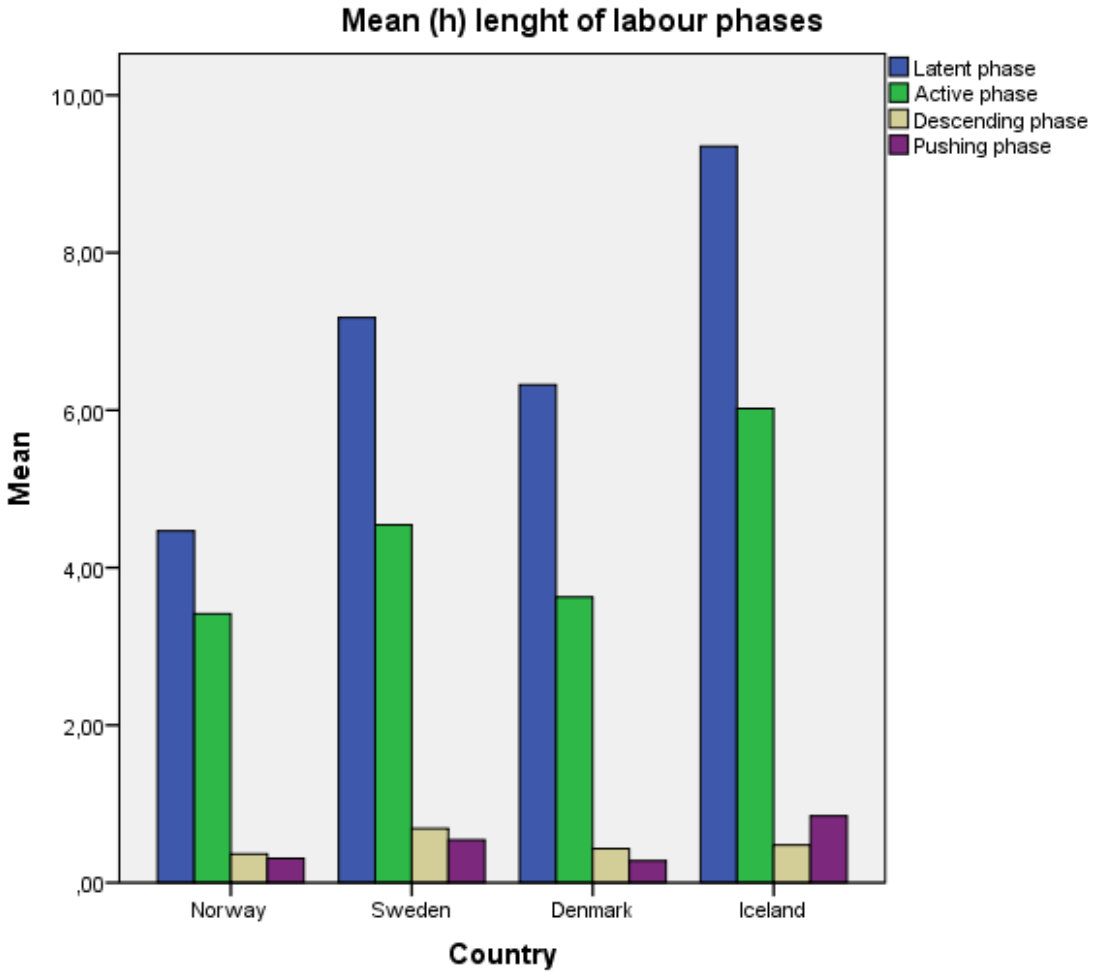

Figure 2. Mean length of labour phases