

Screening and managing low risk pregnant population using continuous wave Doppler ultrasound in a low income population: A cohort analytic study

Spencer Nkosi*, Jennifer Makin*, Busi Vilikazi#, Tsakane Hlongwane*, Robert Pattinson*



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Introduction

- Stillbirths remain high
- 2.6 million stillbirths annually
- Unexplained stillbirths remain high
- 80% of mothers clinically normal

Use of Doppler in high risk pregnancies



- Reduces the odds of perinatal death by 38%



2015 COCHRANE : Alvirec, et al.

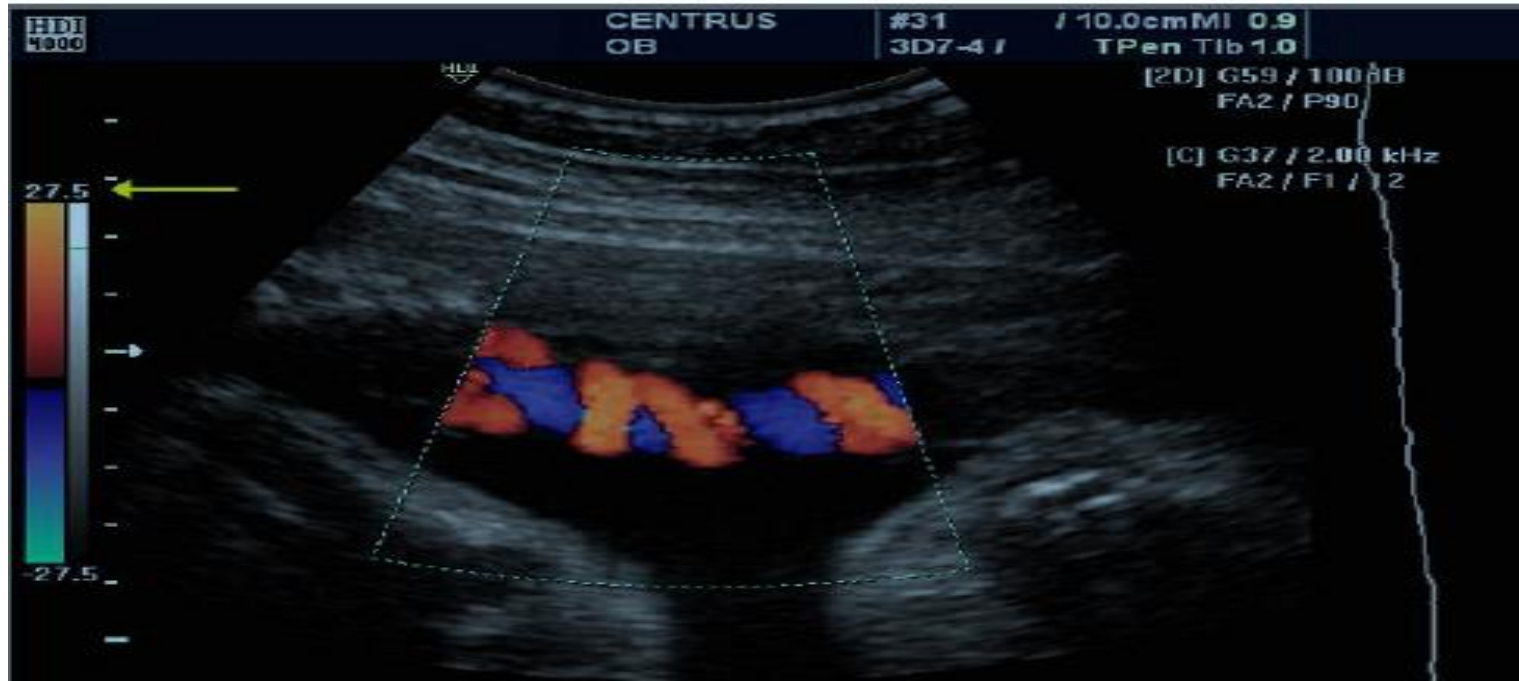
**Doppler in low risk
populations**



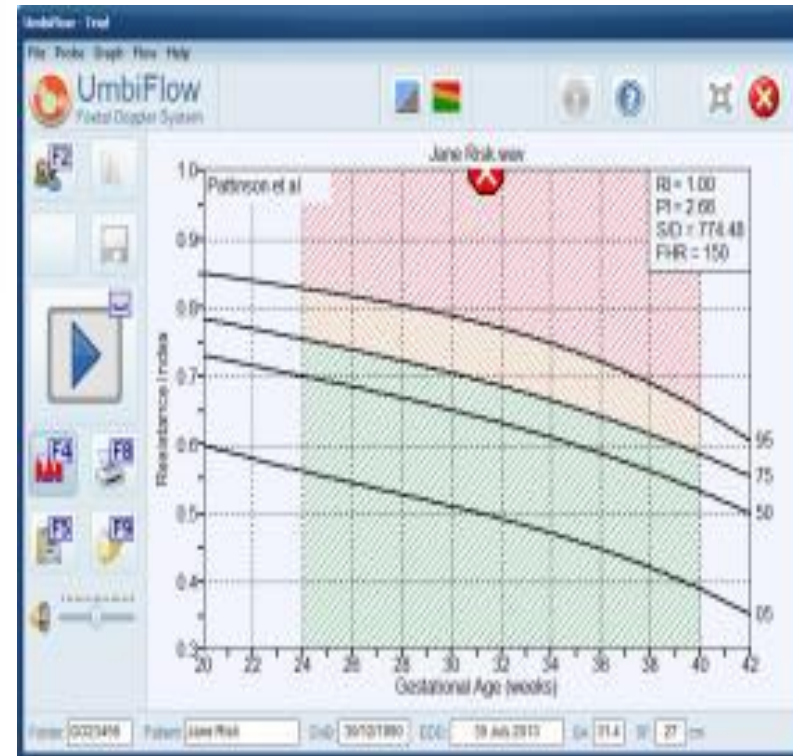
Not effective


Studies =

- Old
- All from developed countries
- Low stillbirth numbers




Umbiflow Doppler device





UMBiflow



UMBIFLOW PRODUCT OVERVIEW

Mobile-connected Doppler analyzer for fetal health evaluation in low-resource settings

The image features a dark brown background with a close-up of a pregnant woman's belly on the left. In the upper right, the UMBiflow logo is displayed, consisting of an orange circle with a white border and a stylized fetal heart icon. Below the logo, the text 'UMBiflow' is written in white. A central inset photograph shows a healthcare provider in a white coat using a tablet to monitor a pregnant woman lying on a table. The woman's hands are resting on her belly. At the bottom, the text 'UMBIFLOW PRODUCT OVERVIEW' is written in orange, followed by 'Mobile-connected Doppler analyzer for fetal health evaluation in low-resource settings' in white.

Research question

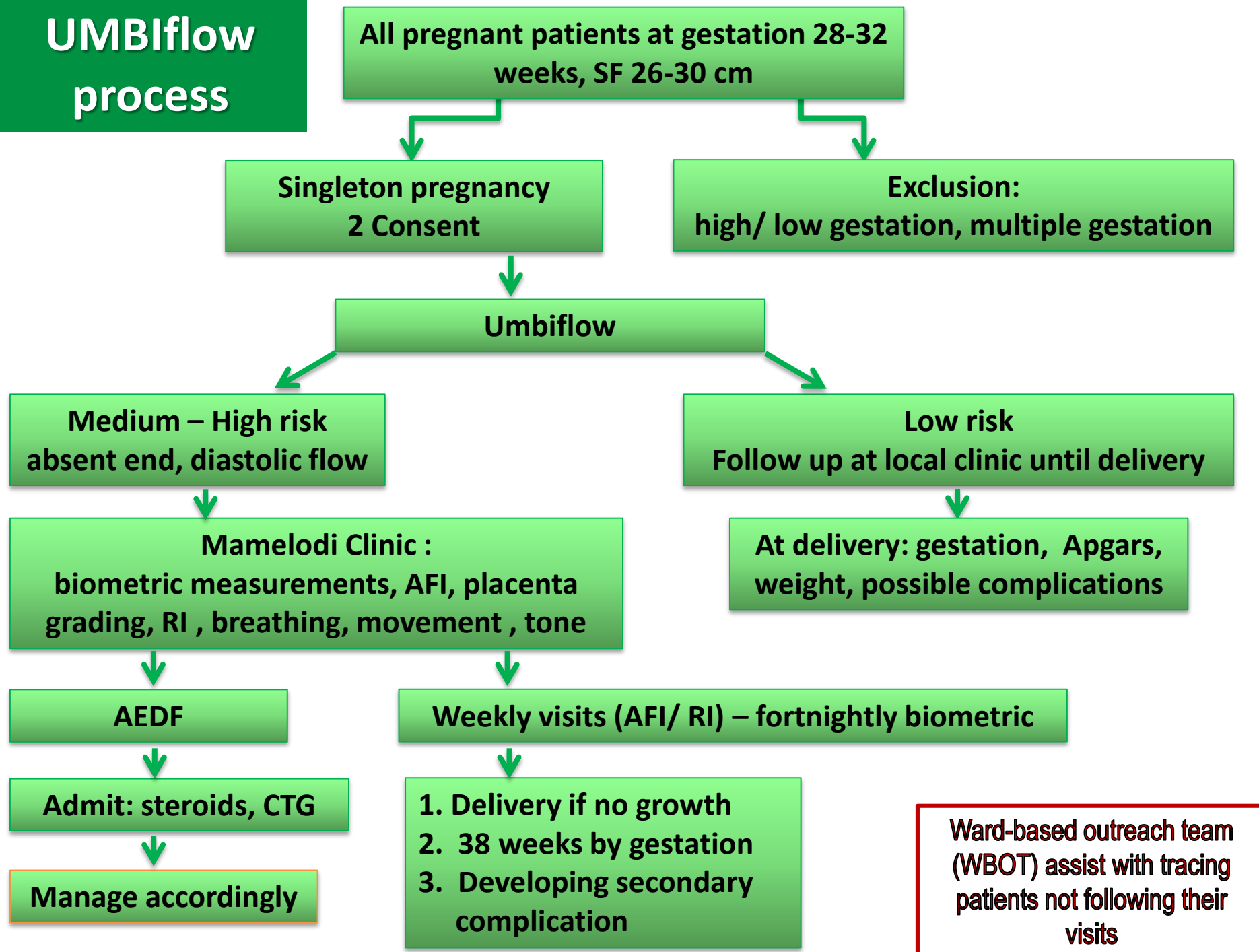
- What is the prevalence of abnormal Umbiflow in a low risk middle income population?
- Does use of a Doppler apparatus detect foetuses at risk of stillbirth and can the deaths be prevented?

Setting: Mamelodi township (400,000 population, half living in shacks or rooms, third unemployed)

Method

- Cohort analytic study
 - Women between 28-32 weeks at Stanza Bopape and Dark City CHC had Umbiflow
 - All women followed up
- Comparison group
 - Women delivering in Mamelodi without Umbiflow, attended antenatal care at Stanza Bopape or Dark City or their drainage clinics
 - Fetuses $\geq 1000\text{g}$,
 - Women ≥ 18 years

UMBiflow process



**Mamelodi Township 25918
births**

Exclude: 1866 births <28 weeks or
1000g, 286 multiple pregnancies,
1834 women not attending
antenatal care, maternal age <18

21942 births in Mamelodi:
12168 births from women that attended
clinics draining to Stanza Bopape and Dark City

**Comparison Group
12168 births**

2868 Umbiflow cases

2545 Low risk

303 High risk

2242 with outcome

297 with outcome

303 outcome
missing

26 outcome
missing

38 AEDF

259 with EDF

**5 Macerated SB
7 Fresh SB
6 NND**

**3 Macerated SB
2 NND**

**3 Macerated SB
3 Fresh SB**

**136 Macerated SB
65 Fresh SB
58 NND**

Comparison High and Low risk Umbiflow

	Umbiflow		Total N=2539	p
	Low Risk N=2242 (88.3%)	High Risk N=297 (11.7%)		
Age years				
<20 years	88 (3.9%)	6 (2.0%)	94 (3.7%)	p=0.006
20-34 years	1757 (78.7%)	227 (76.9%)	1984 (78.5%)	
35+ years	387 (17.3%)	62 (21.0%)	449 (17.8%)	
Missing data	10	2	12	
Parity				
0	712(32.4%)	92 (32.4%)	804 (31.4%)	p=0.044
1-4	1471 (66.9%)	191 (67.3%)	1662 (67.0%)	
5+	15 (0.7%)	1 (0.4%)	16 (0.6%)	
Missing data	44	13	57	
Gestational age (weeks)				
28-33	19 (0.9%)	16 (6.5%)	35 (1.5%)	p<0.0001
34-37	501 (24.4%)	76 (30.8%)	577 (25.1%)	
38+	1530 (74.6%)	155 (62.8%)	1685 (73.4%)	
Missing data	198	50	248	
Low birth weight <2500g	181 (8.1%)	82 (27.6%)	263 (10.4%)	<0.0001
SGA	362/2036 (17.8%)	83/244 (34.0%)	445/2,280 (19.5%)	p=0.022
HIV status Positive	530 (24.7%)	51 (18.5%)	581 (24.0%)	
Missing/unknown	16	3	19	P<0.0001
Severe preeclampsia/eclampsia	8 (0.36%)	2 (0.67%)	13. (0.5%)	

Comparison Umbiflow group with Comparison group

	Umbiflow N=2539	Comparison group N=12168	p
Age years	28.6±5.8	27.7±6.0	
Parity	1.2±1.1	1.3±1.2	
Gestational age (weeks)	38.5±1.7	38.8±2.0	NS
Birth weight g	3068±521	3049±540	NS
Low birth weight <2500g	263 (10.4%)	1464 (12.0%)	NS
SGA	445/2,280 (19.5%)	2905/10886 (26.7%)	<0.0001
HIV status Positive	581 (24.0%)	2973 (24.4%)	NS
Severe preeclampsia/eclampsia	13. (0.5%)	136 (1.1%)	<0.001

Prevalence abnormal in pregnant
women classified as having low risk
pregnancies

Moderate to High risk RI = 11.7%

AEDF = 1.5%

Outcome and impact: Comparison between Umbiflow group and comparison group

Complications	Umbiflow			Comparison N=12168	p
	Low Risk N=2242	High Risk N=297	Total N=2,539		
Induction^	15 (0.7%)	11 (3.7%)	26 (1.0%)	238 (2.0%)	=0.003
Caesarean delivery*	372 (20.2%)	142 (50.9%)	514 (24.3%)	3048 (25.1%)	=0.61
Mortality					Risk ratio (95% CI)
Total Stillbirths (/1000)	12 (5.3)	9 (30.3)	21 (8.3)	201 (16.5)	0.55 (0.37-0.80)
Macerated SB (/1000)	5 (2.2)	6 (20.2)	11 (4.3)	136 (11.2)	0.40 (0.23-0.68)
Fresh SB (/1000)	7 (3.1)	3 (10.1)	10 (4.0)	65 (5.3)	0.84 (0.49-1.44)
NND (/1000)	6 (2.7)	2 (6.9)	8 (3.2)	58 (4.8)	0.72 (0.38-1.32)
Perinatal deaths (/1000)	18 (8.0)	11 (37.0)	29 (11.4)	259 (21.3)	0.58 (0.42-0.81)

Conclusion

- Prevalence AEDF 1.5% (5-10X higher than HIC countries)
- Associated with reduction in perinatal mortality
 - Most in macerated SBs

Future

- Confirm prevalence in other sites:
 - SA
 - LMIC
- If prevalence confirmed – scale up to rest SA