Factors affecting the delivery, access and use of preventive interventions for malaria in pregnancy in sub-Saharan Africa: a systematic review

Jenny Hill[1], Jenna Hoyt[1], Anna Maria van Eijk[1], Helen Smith[1], Feiko O. ter Kuile[1], Jayne Webster[2], Rick Steketee[3]

1 Liverpool School of Tropical Medicine, Liverpool, UK
2 London School of Hygiene & Tropical Medicine, London, UK
3 PATH, Seattle, USA

Background

- 125 million pregnancies occur in malaria endemic countries each year
- MiP can result in pregnancy loss, maternal death, severe maternal anaemia and low infant birth weight
- Since 2004, WHO recommends a package of intermittent preventive treatment (IPTp) with sulfadoxine–pyrimethamine (SP)and regular use of insecticide treated nets (ITNs) together with effective management of clinical malaria and anaemia
- Coverage of IPTp and ITNs in SSA far below international and national targets - Why?

mip malaria in pregnancy consortium

Specific Objectives

1. To summarise the determinants of delivery, access and use of MiP interventions (IPTp and ITNs) from the user, provider and health system perspectives.
2. To summarise the barriers and facilitators of delivery, access and use and of ITPp/ITNs from the user, provider and health system perspectives.
3. To identify and summarise effective interventions to increase coverage and uptake of MiP interventions.

mip malaria in pregnancy consortium

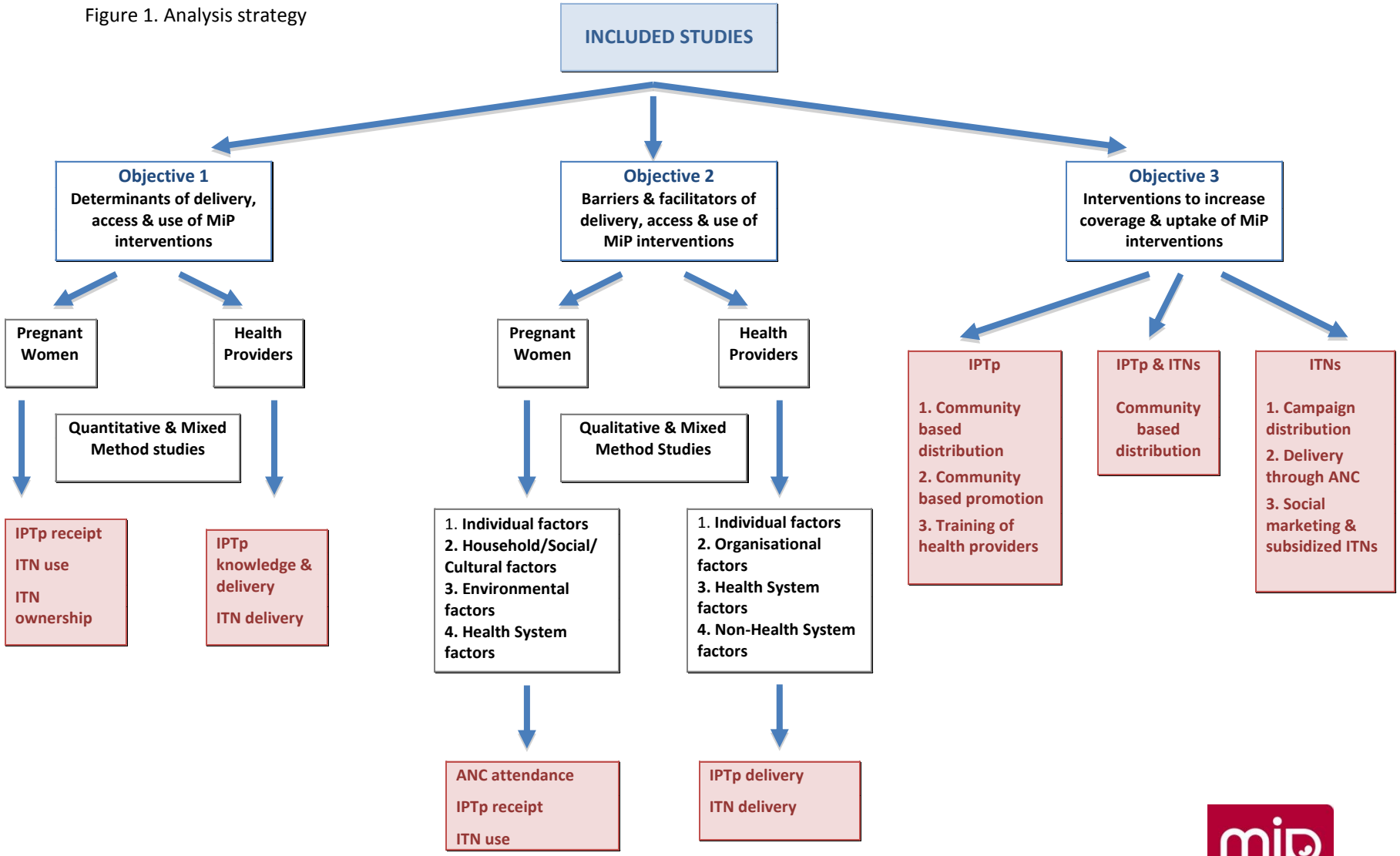
Methods

- Search of electronic databases on 20 January 2012 to identify relevant studies
  - the Malaria in Pregnancy Library (http://library.mip-consortium.org updated January 19, 2012)
  - the Global Health Database
  - Reference search of relevant material.
- Inclusion criteria:
  - (1) original research study
  - (2a) addressed determinants, barriers or facilitators of coverage
  - (2b) evaluated intervention(s) to increase coverage
  - (3) published between Jan 1990 and Jan 2012
  - (4) conducted in sub-Saharan Africa

mip malaria in pregnancy consortium

Analysis plan

Figure 1. Analysis strategy



malaria in pregnancy consortium

Review Methods

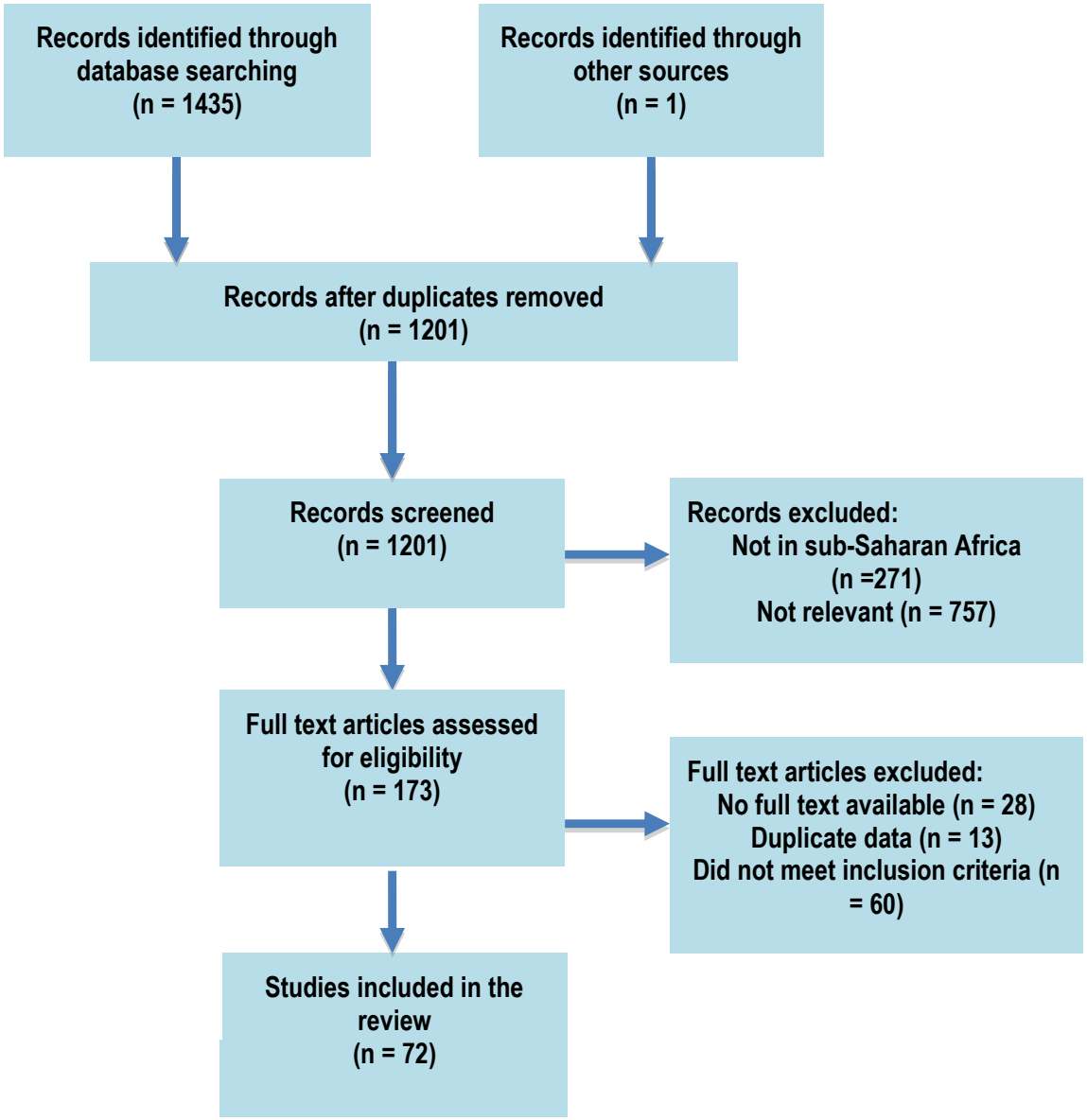
- Determinants (Objective 1)
  - Narrative synthesis of individual study results
  - Meta-analysis of pooled data from multiple studies
- Barriers and facilitators (Objective 2)
  - Narrative synthesis
  - Content analysis
  - Triangulation of results with determinants
- Interventions (Objective 3)
  - Narrative synthesis
  - Integration of results with findings from Objectives 1&2

mip malaria in pregnancy consortium

RESULTS

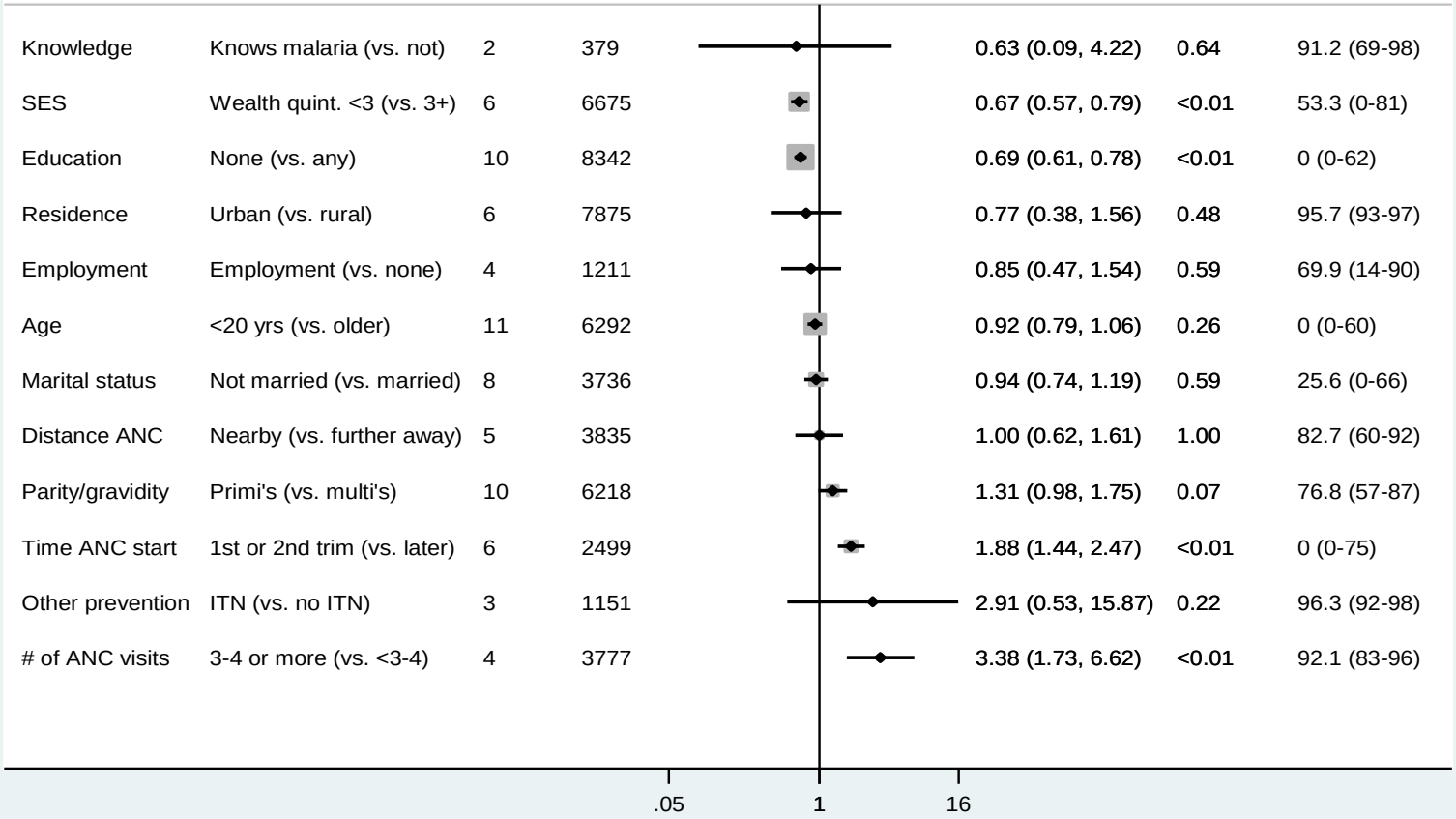
malaria in pregnancy consortium

Figure 2: Flowchart of studies included in the review



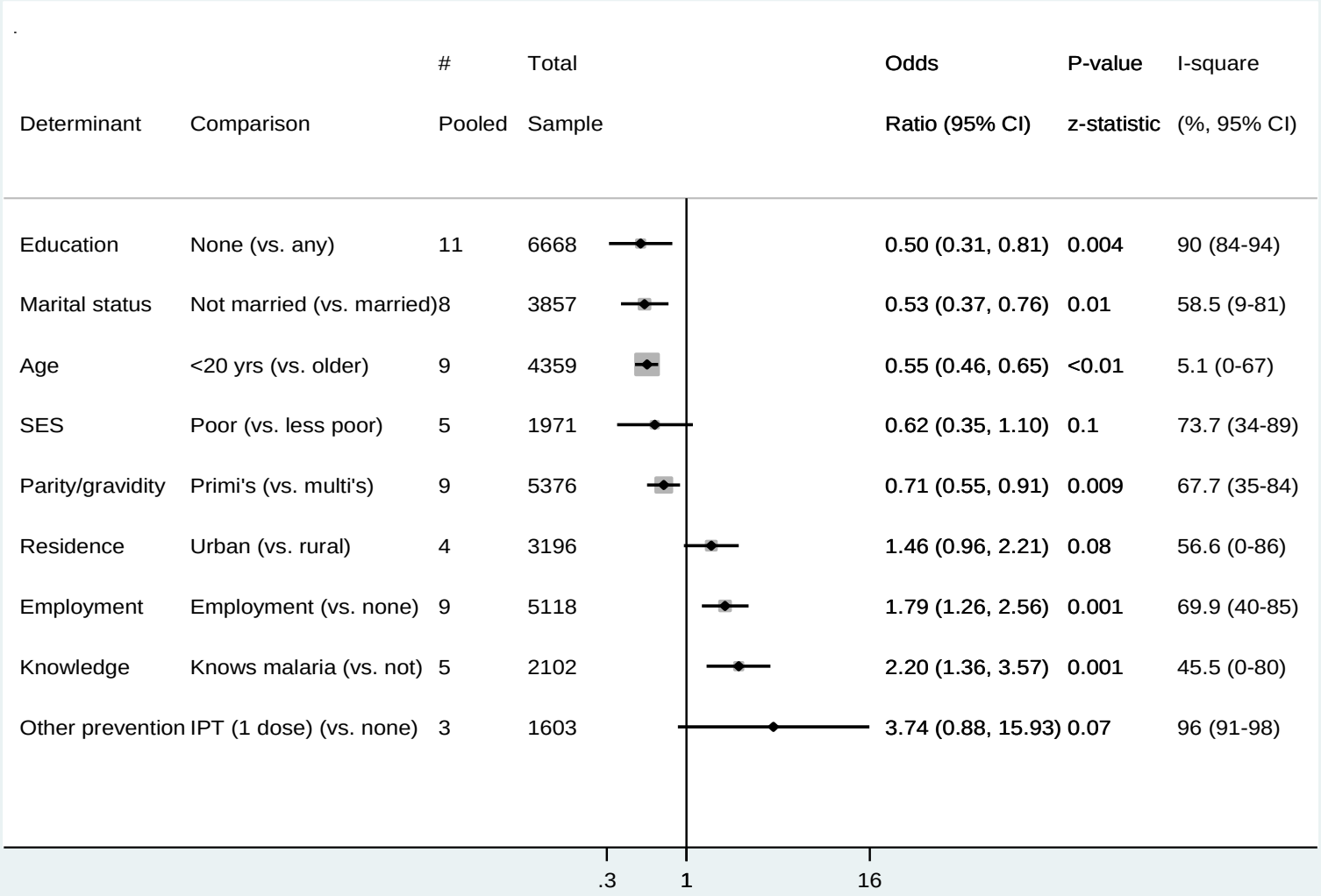
Determinants of IPTp (2+*): Summary estimates assessed in 32 studies

Determinant	Comparison	# Pooled	Total Sample	Odds Ratio (95% CI)	P-value z-statistic	I-square (%, 95% CI)
Knowledge	Knows malaria (vs. not)	2	379	0.63 (0.09, 4.22)	0.64	91.2 (69-98)
SES	Wealth quint. <3 (vs. 3+)	6	6675	0.67 (0.57, 0.79)	<0.01	53.3 (0-81)
Education	None (vs. any)	10	8342	0.69 (0.61, 0.78)	<0.01	0 (0-62)
Residence	Urban (vs. rural)	6	7875	0.77 (0.38, 1.56)	0.48	95.7 (93-97)
Employment	Employment (vs. none)	4	1211	0.85 (0.47, 1.54)	0.59	69.9 (14-90)
Age	<20 yrs (vs. older)	11	6292	0.92 (0.79, 1.06)	0.26	0 (0-60)
Marital status	Not married (vs. married)	8	3736	0.94 (0.74, 1.19)	0.59	25.6 (0-66)
Distance ANC	Nearby (vs. further away)	5	3835	1.00 (0.62, 1.61)	1.00	82.7 (60-92)
Parity/gravidity	Primi's (vs. multi's)	10	6218	1.31 (0.98, 1.75)	0.07	76.8 (57-87)
Time ANC start	1st or 2nd trim (vs. later)	6	2499	1.88 (1.44, 2.47)	<0.01	0 (0-75)
Other prevention	ITN (vs. no ITN)	3	1151	2.91 (0.53, 15.87)	0.22	96.3 (92-98)
# of ANC visits	3-4 or more (vs. <3-4)	4	3777	3.38 (1.73, 6.62)	<0.01	92.1 (83-96)



malaria in pregnancy consortium

Determinants of ITN use: Summary estimates assessed in 21 studies



malaria in pregnancy consortium

Barriers and facilitators to receipt of IPTp: women's perspective (16 studies)

	Individual		Social/Cultural/ Household		Environmental		Health System	
Pregnant women – Facilitators	Qual	Quant	Qual	Quant	Qual	Quant	Qual	Quant
Acceptance of malaria prev drugs	2							
Trust in ANC staff to give good drugs	3							
Believe SP is safe to use/ pregnancy	1							
SP considered effective/treat malaria	2							
Very few or no side effects	2							
Heard about IPTp from radio & ANC							1	
Pregnant women – Barriers								
Low knowledge of IPTp benefits IPTp	3							
Fear of perceived side effects	2							
Experienced side effects	2							
Lacked awareness timing/dosing	2							
Confusion about what drugs are safe	1							
Perception SP strong /miscarriages	1							
Lack of awareness of need for SP	1							
Poor ANC attendance	2	2						
Having to purchase SP/supply water			1	1				
Asked to drink costly fluids with SP			1					
Commitments home (child/farming)			1					
Adolescents/PG not esp. vulnerable			1					
User fees & penalties							2	
Stock outs of SP							1	2
~~Not offered SP by health worker~~								4
ANC cards not updated properly							1	

malaria in pregnancy consortium

Facilitators to delivery and uptake of IPTp: provider's perspective (14 studies)

	Individual		Organisational		Health System		Non-Health System	
Health provider – Facilitators	Qualitative	Quantitative	Qualitative	Quantitative	Qualitative	Quantitative	Qualitative	Quantitative
High knowledge of IPTp strategy	3	1						
High knowledge of dosing/timing	1	2						
Perception that IPTp is beneficial to mother & child	3							
Knowledge that SP is for malaria prevention	2							
Did not feel that side effects were inhibitory	1							
Free drinking water available				1				
IPTp administered by DOT					1	1		
IPTp given free of charge						1		
SP available at the health facility					2			
Staff were given training on IPTp					2			

Barriers IPTp: provider's perspective (14)

	Individual		Organisational		Health System		Non-Health System	
Health provider – Barriers	Qualitative	Quantitative	Qualitative	Quantitative	Qualitative	Quantitative	Qualitative	Quantitative
Confusion about timing/dosing	3	1						
Low knowledge of IPTp strategy	2	1						
Low knowledge side effects of SP	1	2						
SP given regardless of gestation	1							
Imprecise estimation of gestation	1							
Not give SP on empty stomach	1							
Staff too busy to distribute SP			1					
Lack of water cups at facility			3					
Health educ. not in local language			1					
Variation in information on IPTp				1				
Guidelines on IPTp not avaiable			1	1				
IPTp based on restrictive schedule					1			
SP stock outs					4	2		
Lack of supervision & monitoring					2			
User fees for IPTp					1			
Lack of recent IPTp training					2	1		
Private facilities dispense other					1			
Incompatibilities with other prograr					1			
Poor ANC access by women					1			
Water shortages at facilities							2	1
Negative media coverage for SP							1	
Women prefer other malaria drugs							1	
Complaints of side effects from SP							2	
Late ANC attendance by women							3	

Integrating findings from each synthesis: Determinant and barrier studies

IPTp

- ✓ Education ∞ knowledge of malaria or IPTp
- ✓ Socio-economic status ∞ costs (direct and indirect)
- ✓ Timing and number of ANC visits ∞ barriers to ANC attendance

ITNs

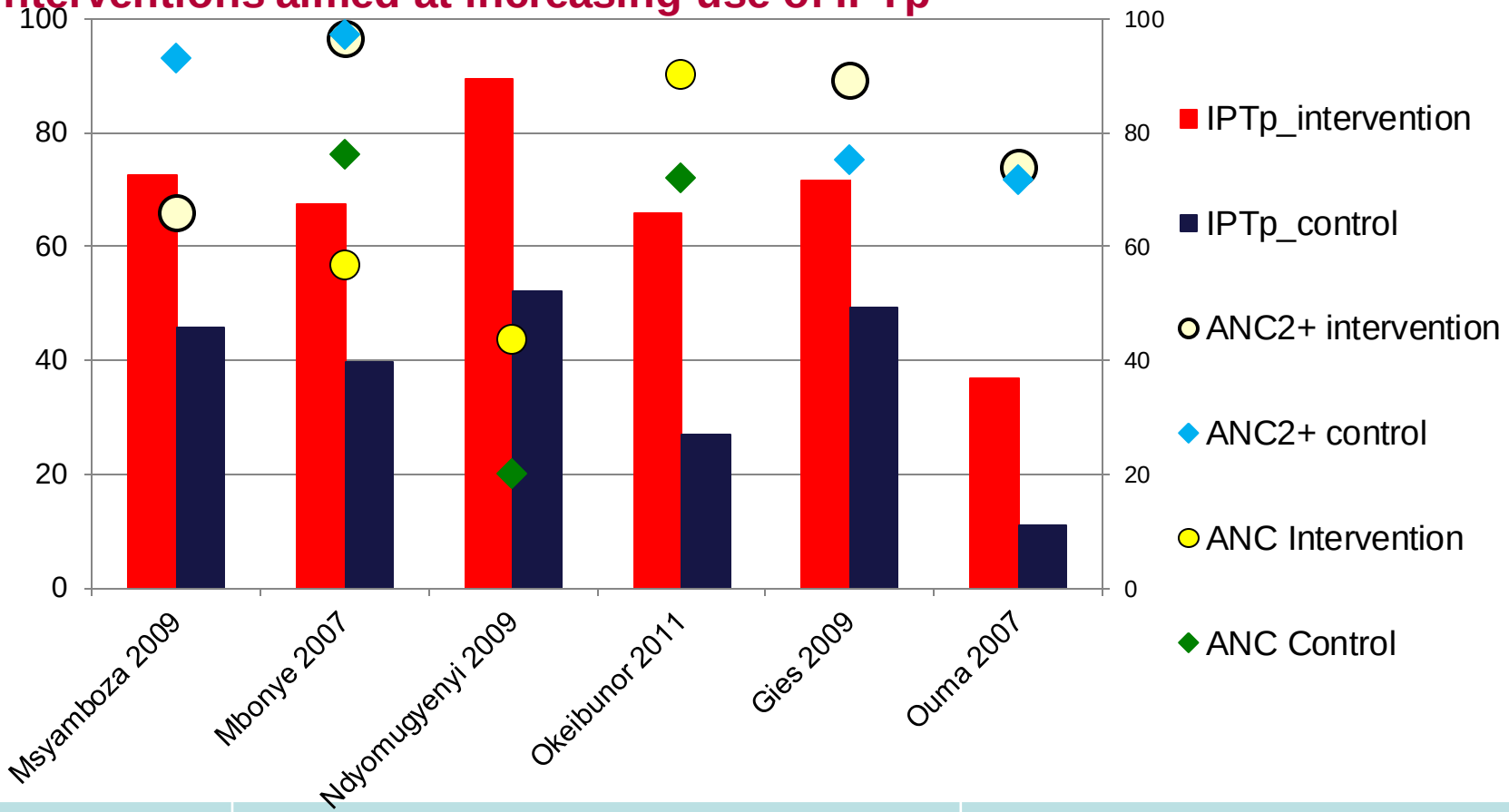
- ✓ Age and marital status ∞ adolescents and unmarried women
- ✓ Parity and gravidity ∞ social or cultural constraints?
- ✓ Education and knowledge ∞ knowledge of malaria or ITNs
- ✓ Employment status ∞ costs (direct and indirect)

Intervention studies (19 studies)

Distribution strategy	IPTp	ITN
Community based distribution	Okeibunor, 2011 Msyamboza, 2009 Ndyomugyenyi, 2009 Mbonye, 2007	
Promotional campaign **Education of health providers**	Gies, 2009 Ouma, 2007	
Campaign distribution: free ITNs		Thwing, 2011 Okeibunor, 2011
Campaign distribution: voucher subsidy		Ahmed, 2010 Khatib, 2008
ANC delivery: free ITNs		Pettifor, 2009 Guyatt, 2003
ANC delivery: voucher subsidy		Beiersmann, 2010 Marchant, 2010 Hanson, 2009 Muller, 2008 Kweku, 2007
Social marketing: subsidized ITNs		PSI Kenya, 2008 PSI Madagascar, 2007 PSI Burundi, 2007

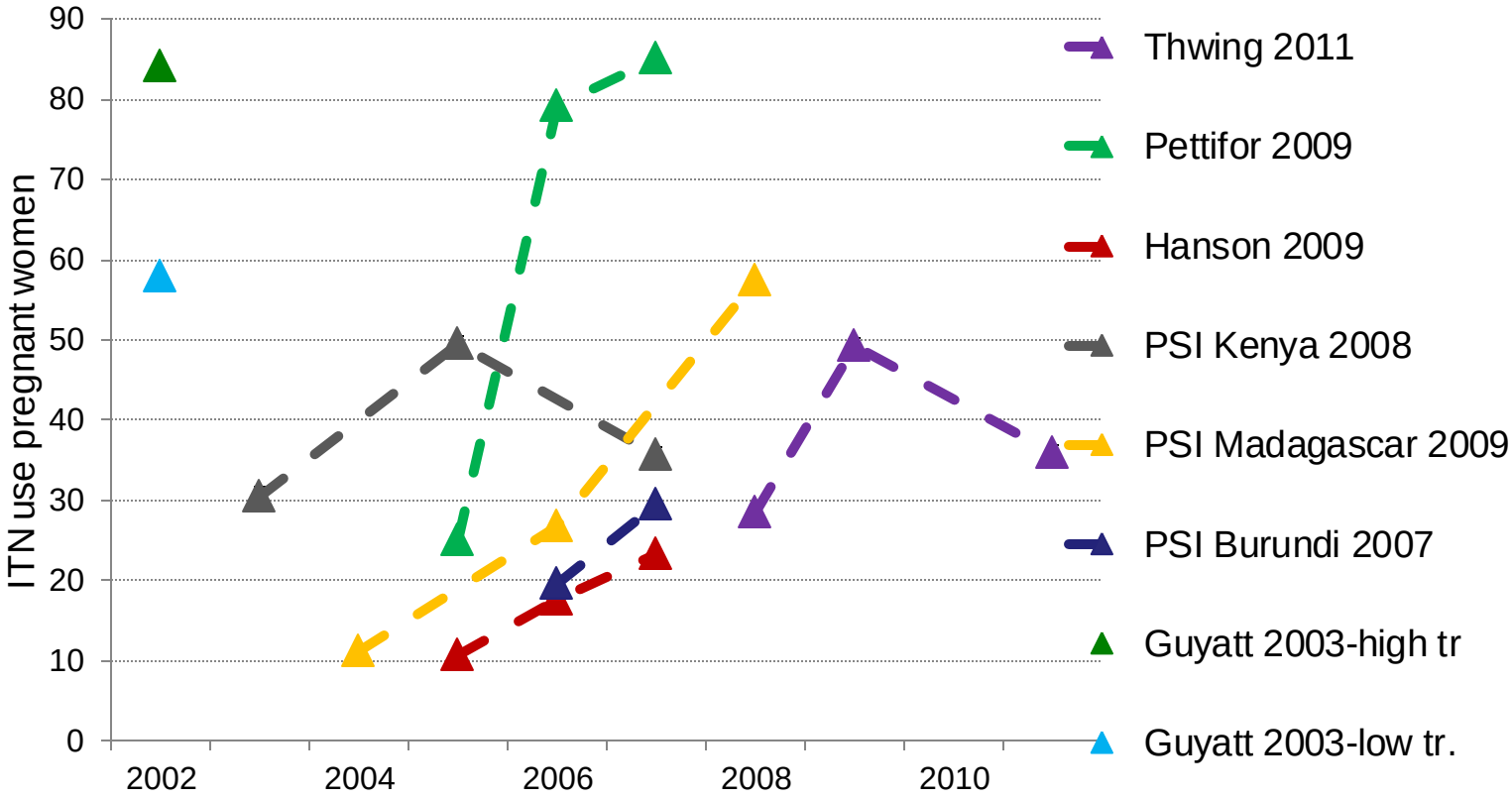
mip malaria in pregnancy consortium

Interventions aimed at increasing use of IPTp



Report	Method	Evaluation
Msyamboza 2009	IPTp by community health workers (MLW)	Comparison by region
Mbonye 2007	IPTp by community resource persons (UG)	Comparison by source of IPTp. ANC=4+
Ndyomugyenyi 2009	IPTp by workers in onchocherciasis prog (UG)	Comparison by region. ANC=4+
Okeibunor 2011	IPTp by community health workers (NIG)	Comparison by region. ANC=1+
Gies 2009	IPTp promoted by community workers (BF)	Formal cluster randomized trial
Ouma 2007	Training of facility health workers (KE)	Comparison by region

Interventions aimed at increasing use of ITNs among pregnant women



Report	Method	Evaluation
Thwing 2011	Free ITNs/vouchers through campaign SE	2008 MIS, 2009 Evaluation campaign, 2011 DHS
Pettifor 2009	Free ITNs through ANC (DRC)	2007: at delivery and 6 months postpartum
Hanson 2009	Voucher subsidies through ANCs (TZ)	Annual program evaluation (2005-2007)
PSI 2007,08,09	Social marketing and subsidized ITNs	Annual evaluations
Guyatt 2003	Free ITNs through ANC; Transmission (KE)	Evaluation after 1 year

Integrating findings from each synthesis: Barrier and Intervention studies

IPTp - Pregnant women factors (1)

Findings from observational studies		Findings from intervention studies	
Categories derived from barriers	**Implications for interventions to increase uptake**	**Type of intervention evaluated**	**Number of intervention studies**
Category 1 – Mothers' knowledge **Example barriers** - **Lack of knowledge of the preventive benefits of IPTp** - **Belief use of drugs or SP in pregnancy is unsafe e.g. could cause abortion** - **Fear of perceived side effects of SP** - **Unaware of the dangers of malaria in pregnancy**	Promotion of IPTp strategy and safety of SP for IPTp through a variety of channels e.g. community based, clinic based, media, local leaders	Community-based promotion of IPTp and referral of women to ANC	1 study in Burkina Faso (Gies 2009)
Category 2 – Access to ANC **Example barriers** - **Poor access to ANC** - **Direct and indirect costs of accessing ANC** - **Commitments to farming, employment or childcare** - **Unwillingness to reveal pregnancy** - **Lack of awareness of importance of ANC services**	Community based distribution of IPTp in hard to reach populations with limited access to ANC e.g. through community based volunteers and/or community based referral systems to increase use of ANC	Community based distribution in settings with poor access to ANC	1 study in Nigeria (Okeibunor 2011)

mip malaria in pregnancy consortium

IPTp- Pregnant women factors (2)

Findings from observational studies		Findings from intervention studies	
Categories derived from barriers	**Implications for interventions to increase uptake**	**Type of intervention evaluated**	**Number of intervention studies**
<u>Category 3 –Affordability of ANC services</u> **Example barriers** - **ANC registration fees** - **Laboratory fees** - **Cost of SP** - **Unofficial penalties charged by health providers for late ANC attendance**	See health provider factors		
<u>Category 4 – Quality of ANC services</u> **Example barriers** - **Providers do not offer IPTp** - **SP unavailable** - **Lack of water or cups for DOT** - **Poor attitudes of health providers** - **Lack of information or instructions given by health providers regarding IPTp**	Community based distribution of IPTp e.g. through community based volunteers and/or improved quality of ANC services (See health provider factors)	Community based distribution in settings with existing drug distribution programmes e.g. onchocerciasis	3 studies: 1 in Tanzania (Msyamboza 2009) and 2 in Uganda (Ndyomugyenyi 2009, Mbonye 2007)

malaria in pregnancy consortium

IPTp- Health provider factors (1)

Findings from observational studies		Findings from intervention studies	
Categories derived from barriers	**Implications for interventions to increase uptake**	**Type of intervention evaluated**	**Number of intervention studies**
Category 1 – Provider knowledge **Example barriers** - **Poor knowledge of IPT strategy, timing and dosage of SP** - **Imprecise estimation of gestational age** - **Confusion of when to give IPTp in relation to treatment of malaria, HIV or other** - **Perception that women will or should not take SP on empty stomach**	Training and supervision of health workers	Training of health workers	1 study in Kenya (Ouma 2007)
Category 2 – Provider attitudes **Example barriers** - **Health education not given in local language** - **Information and instructions on IPTp not given to pregnant women** - **Providers treat women with lack of respect**	Training and supervision of health workers on provider client interactions	None	None

malaria in pregnancy consortium

IPTp- Health provider factors (2)

Findings from observational studies		Findings from intervention studies	
Categories derived from barriers	**Implications for interventions**	**Type of intervention evaluated**	**No. of studies**
Category 3 – Health facility organisation **Example barriers** - **Restrictive ANC opening hours** - **Lack of cups/ drinking water** - **Frequent provider absence from work** - **Ineffective staff rosters**	Reorganisation of staff rosters, opening hours etc. and better management, supervision and accountability of staff	None	None
Category 4 – Inadequate guidance on IPTp **Example barriers** - **Varied information given to health providers on IPTp** - **No guidelines at facility** - **Lack of supervision and monitoring of IPTp** - **Lack of recent training**	Provision of consistent simple guidelines to all health facilities, both public and private sectors, together with training and supervision	Modeling the effect of simple Guidelines on IPTp coverage	1 study in Tanzania (Gross et al 2011)
Category 5 – Fees for ANC services **Example barriers** - **ANC registration fees** - **Cost of SP** - **Unofficial penalties charged for late ANC attendance**	Modification or removal of user fees and regulation against imposition of penalties	None	None

mip malaria in pregnancy consortium

ITNs - Pregnant women factors

Findings from observational studies		Findings from intervention studies	
Categories derived from barriers	**Implications for interventions**	**Type of intervention evaluated**	**No. of studies**
<u>Category 1 – Mothers' knowledge</u> **Example barriers** - **Lack knowledge of benefits of ITNs** - **Discomfort of using ITNs** - **Fear of ITN chemicals** **<u>Category 2 – Household or Cultural constraints</u>** - **Lack of support from husband/community** - **Lack cultural habit of using ITNs**	Promotion of ITN strategy and safety of insecticides used to treat nets through a variety of channels e.g. community based, clinic based, media, local leaders	Promotional campaigns using social marketing	3 social marketing studies by PSI: Burundi (2007), Kenya (2008) and Madagascar (2007)
<u>Category 3 – Access to ITNs</u> **Example barriers** - **Lack of retailers** - **Cost of ITNs** - **Inability to pay top-up fees on vouchers** - **Direct and indirect costs of accessing ITN distribution points**	Delivery of free ITNs to pregnant women through ANC or campaigns OR Delivery of voucher subsidies through ANC or campaigns	Delivery of free ITNs to pregnant women via ANC or campaigns OR Delivery of voucher subsidies through ANC or campaigns	3 studies: 2 studies via ANC (Pettifor 2009, Guyatt 2003); 1 study via campaign (Thwing 2011) 7 studies: 5 studies via ANC (Beiersmann 2010, Marchant 2010, Hanson 09, Muller 2008, Kweku 2007) 2 studies via campaigns (Ahmed 2012, Khatib 2008)

mip malaria in pregnancy consortium

ITNs- Health provider factors

Findings from observational studies		Findings from intervention studies	
Categories derived from barriers	**Implications for interventions**	**Type of intervention evaluated**	**No. of studies**
Category 1 – Provider knowledge **Example barriers** - **Lack of knowledge of ITN benefits for mother and child**	Training and supervision of health workers on ITNs	None	None
Category 2 – Provider attitudes **Example barriers and facilitators** - **Providers refuse to offer ITNs to pregnant women** - **Providers impose eligibility criteria for ITNs or vouchers**	Better training, management, supervision and accountability of staff	None	None
Category 3 – Health facility organisation **Example barriers** - **Vouchers not available at facility** - **As for IPTp**	Reorganisation of staff rosters, opening hours etc. and better management, supervision and accountability of staff	None	None
Category 4 – Fees for ANC services **Example barriers and facilitators** - **ANC registration fees** - **Cost of ITNs**	Removal of user fees and regulation against imposition of penalties	None	None
Category 5 – Supply of ITNs/vouchers **Example barriers and facilitators** - **Poor stock control** - **Stock outs of ITNs** - **Vouchers not available**	Timely procurement and distribution systems for ITNs or vouchers	None	None

mip malaria in pregnancy consortium

CONCLUSIONS

malaria in pregnancy consortium

Conclusions (1): Determinants

- Determinants of uptake of IPTp and ITNs not the same
- IPTp coverage lower among: poorest women; women with no education; and, in some countries, rural women. Inequities may reflect determinants of women's access to ANC but barrier studies show some relevant to IPTp.
- ITN coverage lower among: women with no education or less knowledge; single, adolescent or primis; women without employment; and rural women - suggesting that ANC services are an important source of free ITNs
- Women's utilisation of ANC (timing and frequency) an important determinant of PTp receipt

mip malaria in pregnancy consortium

Conclusions (2): Barriers

- Many of the barriers to the delivery of IPTp and ITNs reflect broader weaknesses in the health system, however some are specific to the intervention
- Unpack the barriers at the different levels of users and providers in order to target appropriate interventions
- More progress to date with demand side interventions
- Dearth of research on interventions to address supply side factors at ANC which contribute to slow progress with IPTp and ITN uptake
- Some quick wins, others require medium to long term strategies

mip malaria in pregnancy consortium

Conclusions(3): IPTp Intervention studies

- Community based *distribution* of IPTp (4 studies)
  - Study designs variable
  - Increased uptake of IPTp, but.....
  - 2 studies showed concurrent reduction in ANC attendance (although 2 studies showed an increase in ANC attendance)
  - Success of strategy highly context specific (e.g. Uganda)
- Community based *promotion* of IPTp (1 study)
  - Increased IPTp uptake as well as ANC utilisation
  - Adolescents identified as a high risk group in Burkina Faso
- Re-training of health workers on IPTp delivery (1 study)
  - Increased IPTp uptake

mip malaria in pregnancy consortium

Conclusions(4): ITN Intervention studies

- ITN (or voucher) distribution through campaigns (4 studies)
  - Limited impact on coverage among pregnant women (3/4)
  - Senegal delivery of ITN vouchers to all households with U5s
- ITN (or voucher) distribution through ANC (5+2 studies)
  - Increase in coverage compared to baseline (4/5)
  - ITN voucher schemes less equitable than free ITNs via ANC
  - Voucher schemes experienced more operational problems
  - Delivery through ANC will not reach women who don't attend
- Social marketing of ITNs (3 studies)
  - Effective in 'normalising' ITN use within local culture
  - Comparatively expensive to implement and sustain

mip malaria in pregnancy consortium

For the meeting participants

Take away headlines

- We are not making the most of women who do access ANC, many missed opportunities
- Knowledge on malaria/IPTp important for both providers and pregnant women
- Whilst alternative distribution strategies exit for ITNs, free ITNs through ANC appears most effective

Of importance to malaria programmes

- Barriers vary by country and sub-nationally
- Priority actions to tackle problems needed at national and sub-national levels
- Actions at district and facility levels requires decentralised data for decision making and accountability
- Champions needed

Thank you!

malaria in pregnancy consortium

malaria in pregnancy consortium

Barriers and facilitators to ITN ownership & use: women's perspective (15 studies)

	Individual		Social/Cultural/Household		Environmental		Health System	
Pregnant women – Facilitators	Qualitative	Quantitative	Qualitative	Quantitative	Qualitative	Quantitative	Qualitative	Quantitative
Knowledge & awareness of ITN benefits for mother & child	1	2						
Pregnant women – Barriers								
Feeling hot & uncomfortable under the ITN	2	4						
Inconvenience of putting it up & down each night		2						
Not used to using ITNs	1							
Fear of the chemicals on the ITNs	2							
Can't afford the cost of ITNs			2	5				
Lack of community support from husband &/or community			2	2				
Don't like the style or colour of ITN available			1					
Unfair community distribution			1					
Place of residence						2		
Seasonality (hot weather)					1	1		
Perception that there are no mosquitoes in the area					1	2		
Unavailability of ITNs							2	1
ITN stock outs							1	
Travel to collect ITNs with voucher							1	
Variation in voucher top-up costs							1	

mip malaria in pregnancy consortium

Barriers to delivery and uptake of ITNs: provider's perspective (4 studies)

	Individual		Organisational		Health System		Non-health System	
Health provider – Facilitators	Qualitative	Quantitative	Qualitative	Quantitative	Qualitative	Quantitative	Qualitative	Quantitative
Perception that free distribution of ITNs is beneficial	1							
Recommending ITN use to pregnant women		1						
Health provider – Barriers								
Health providers imposing eligibility criteria for vouchers	1							
Vouchers not available					1			
Stock out of ITNs					2			
Cost of ITNs					1		1	

mip malaria in pregnancy consortium

Strengths & Limitations

- Triangulation of data from quantitative, qualitative and mixed method studies was used to increase the content validity
- Integration of data from 3 syntheses
- Reviewer bias limited by use of 2 independent reviewers
- Scope of the review findings is restricted to the topics reported by the authors of the included studies
- MiP library (the primary source of studies) to date has focussed on European languages, predominantly English

mip malaria in pregnancy consortium