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Evidencing gaps in Activities >> Epi Impact for country level resource allocation

Overview

- Rational and overall aim
- Summarise efforts so far and current direction [Madeleine]
- Discussants
  - Modellers perspective [Rein]
  - Economist perspectives [Nick]
  - WHO perspective [Babis]
  - KNCV perspective [Kathy]
  - Everybody

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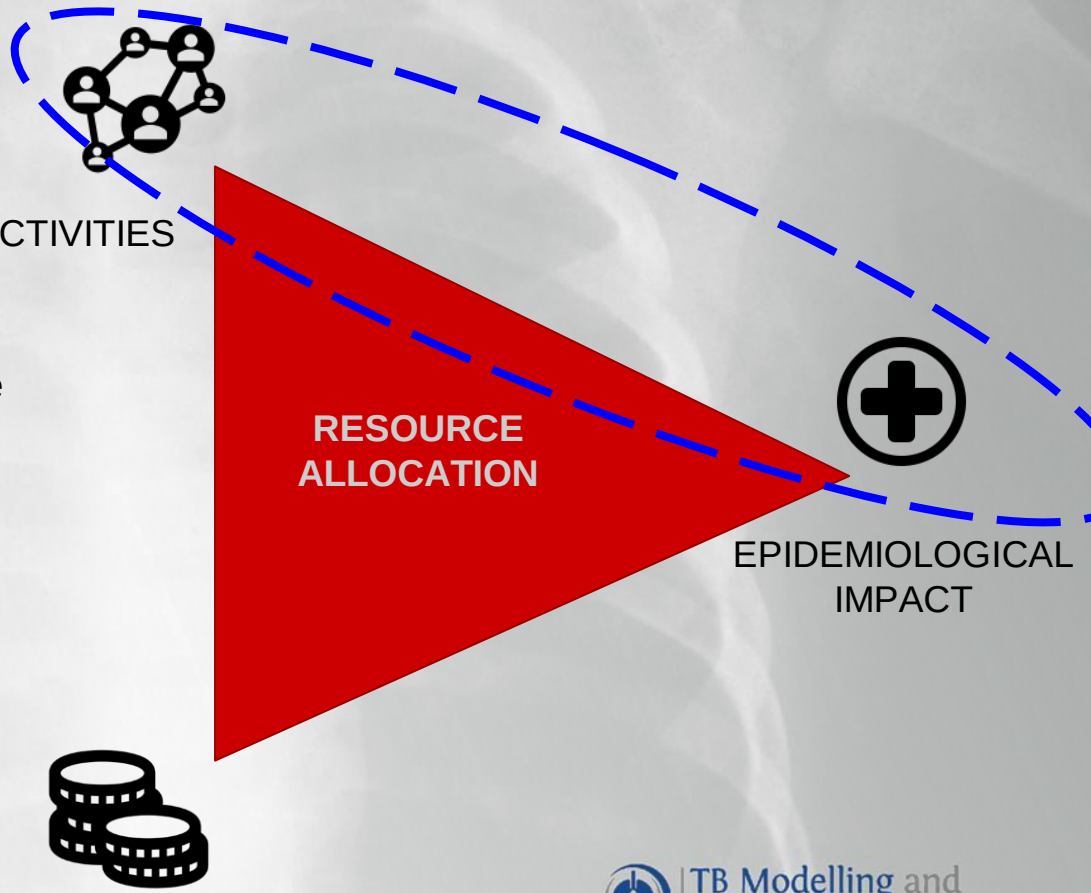
Problem statement

- Global and national stakeholders being asked to max impact of funds for TB care and prevention
- Regardless of method, requires knowledge of **activities**, the **cost**, and the **epi impact**, for the range of policy options
- So can use, along with (many) other constraints, to id strategy
- But v. limited info linking specific programmatic activities increasing coverage to epi impact.

=> decision-makers face huge uncertainty when allocating funding, likely leading to suboptimal allocation of funds, and ultimately, to lives unnecessarily lost.



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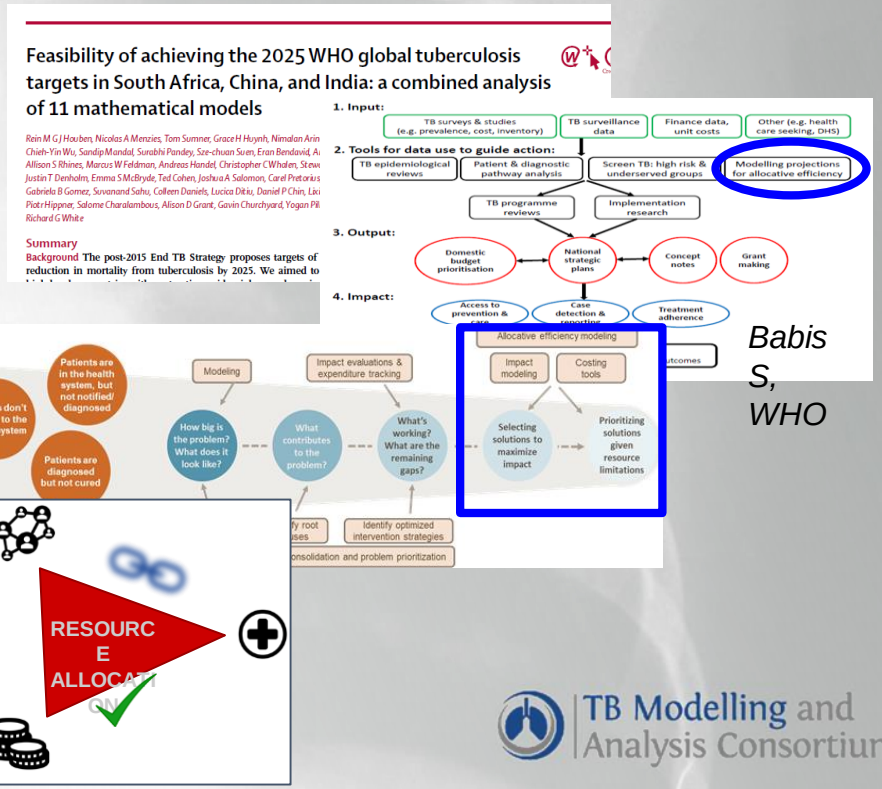
Linkage with ongoing activities...

- TB MAC ‘Targets’ work highlighted this key data gap, when NTPs asked to ~guess what activities would lead to assumed intervention coverage increases
- Modelling to inform RA is a key need identified by the WHO and in the People/Patient centered framework
- Work is being done collecting data on costs for specific activities (hear more tomorrow)
- But, filling activities >> impact data gap remains largely ignored



Babis S, WHO

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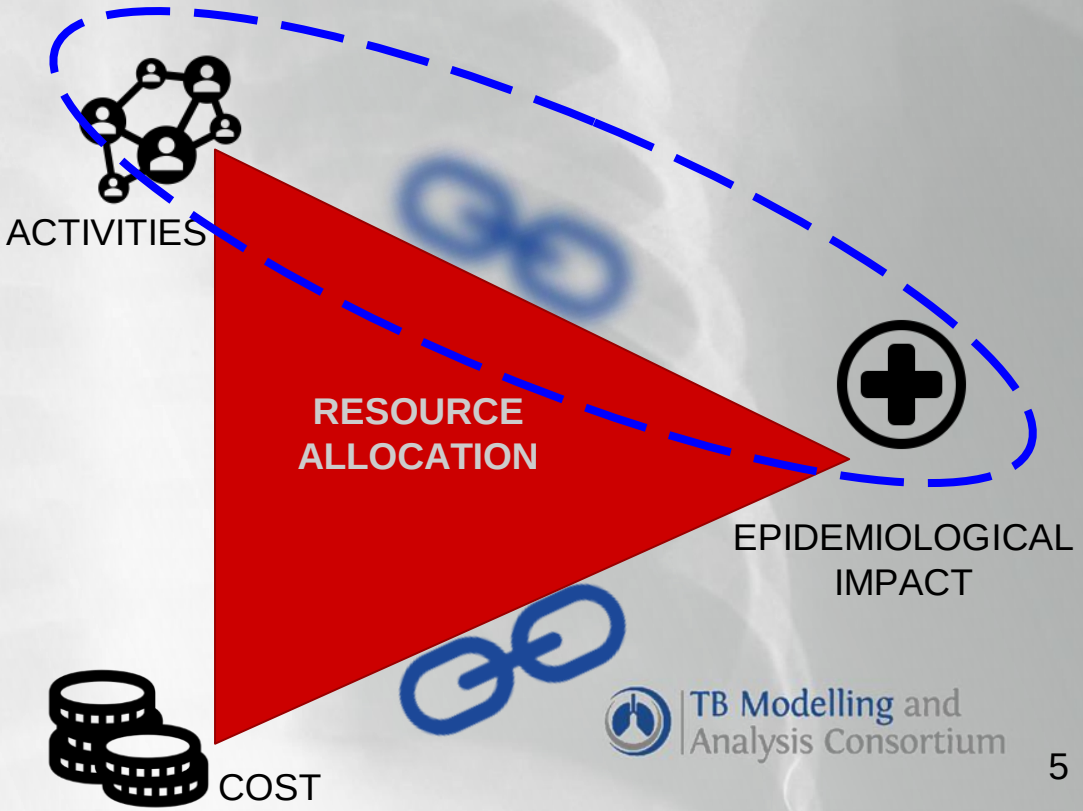
Background, rationale and overall aim

Overall aim

- Identify, collate and summarise evidence on activities, by health outcomes and outputs, along the prevention and care cascade, to better inform TB resource allocation



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ACT|IMP

- Summarise efforts so far and current direction
  - Overview of the project
  - Evolution TB MAC's role in this bigger aim
  - Current project direction
- Discussants
  - Modellers perspective [Rein]
  - Economist perspectives [Nick]
  - WHO perspective [Babis]
  - KNCV perspective [Kathy]
  - Everybody

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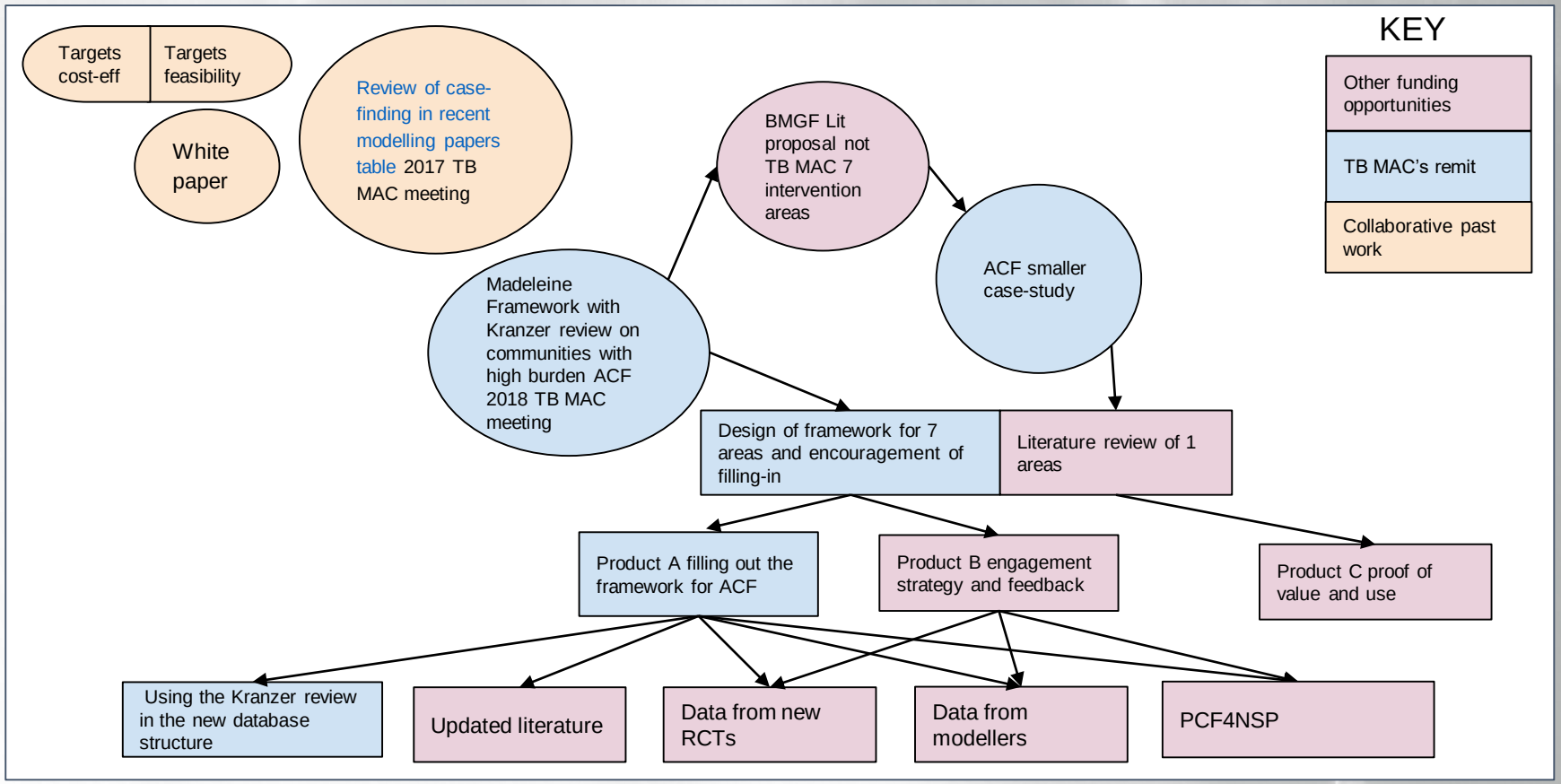
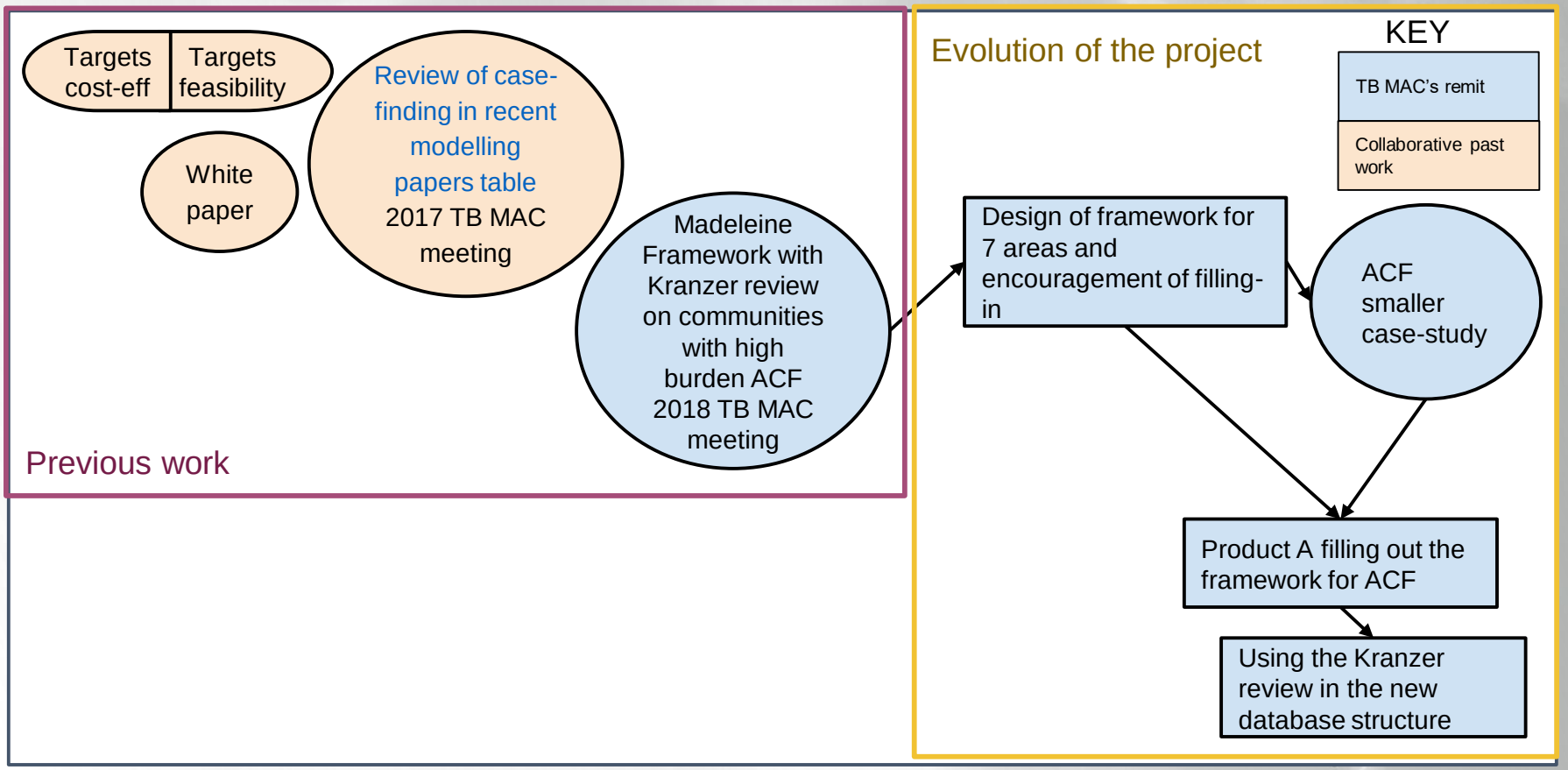
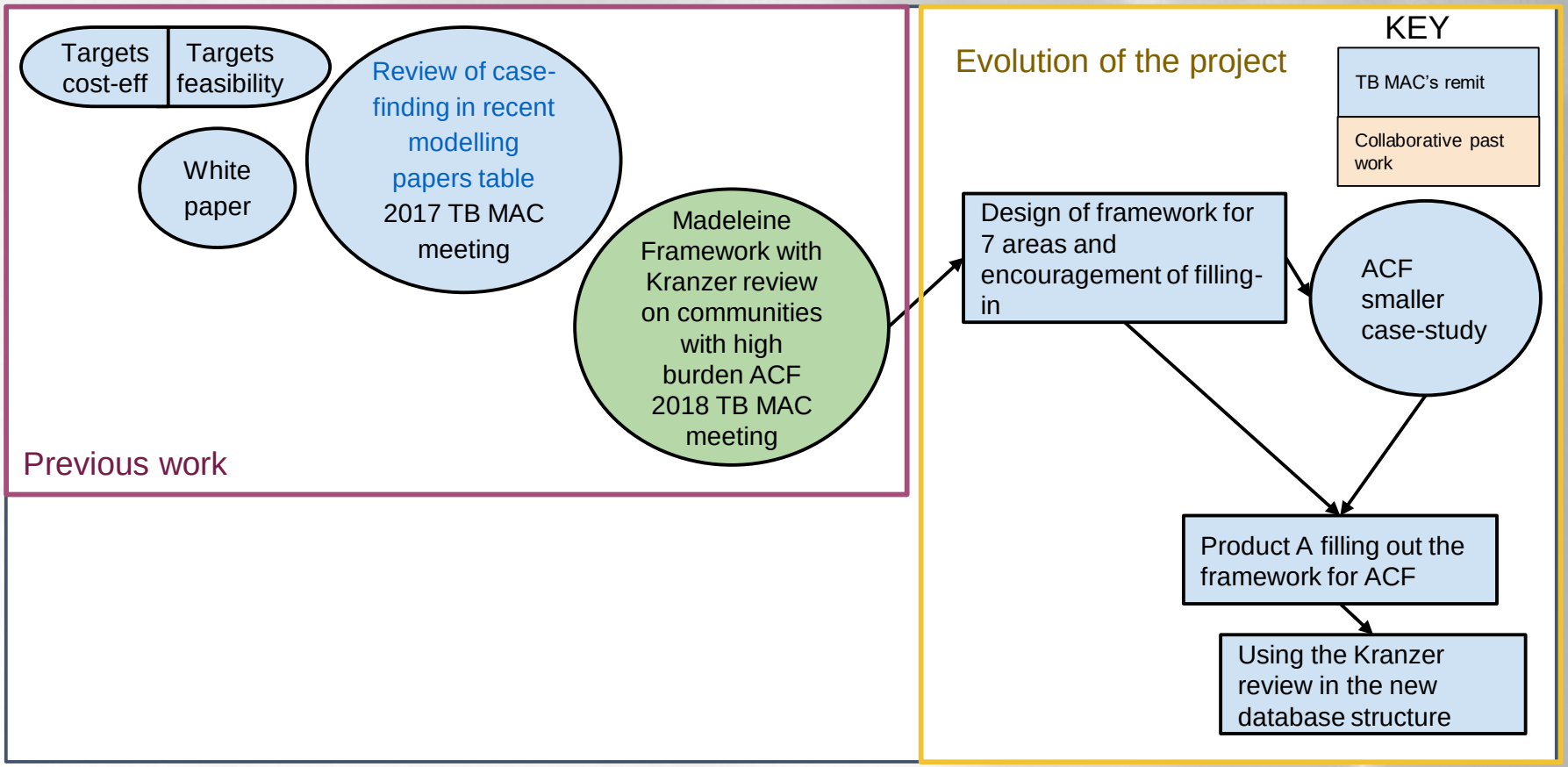
ACT | IMP Overview of wider project to address overall aim



ACT | IMP - Summary of previous work & Evolution of the project



ACT | IMP - Summary of previous work & Evolution of the project



Outcomes from last TB MAC September meeting 2018

3 part problem

1. What **interventions** are available ?
2. How to translate them in to direct **epidemiological impact**?
3. What are the **activities required to increase coverage?** (country specific)

Concrete steps

1. **Case studies** of country implementation
2. Generate **input form** to collate data from **countries/modelling teams**
3. **Database** generation and maintenance
4. **Communication with data input calls & availability advertised**

TB MAC Role?

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Process post TB MAC Sept 2018 meeting

- December developed deliverables
- Including structuring a database for 7 intervention areas
- April 2019 meeting with stakeholders:

Outcome from the April 2019 meeting with Stakeholders

1. Did these data exist to be collated?
2. How would it be used in decision pathways ?
3. And how do these data bring value to future decisions and programme designs?

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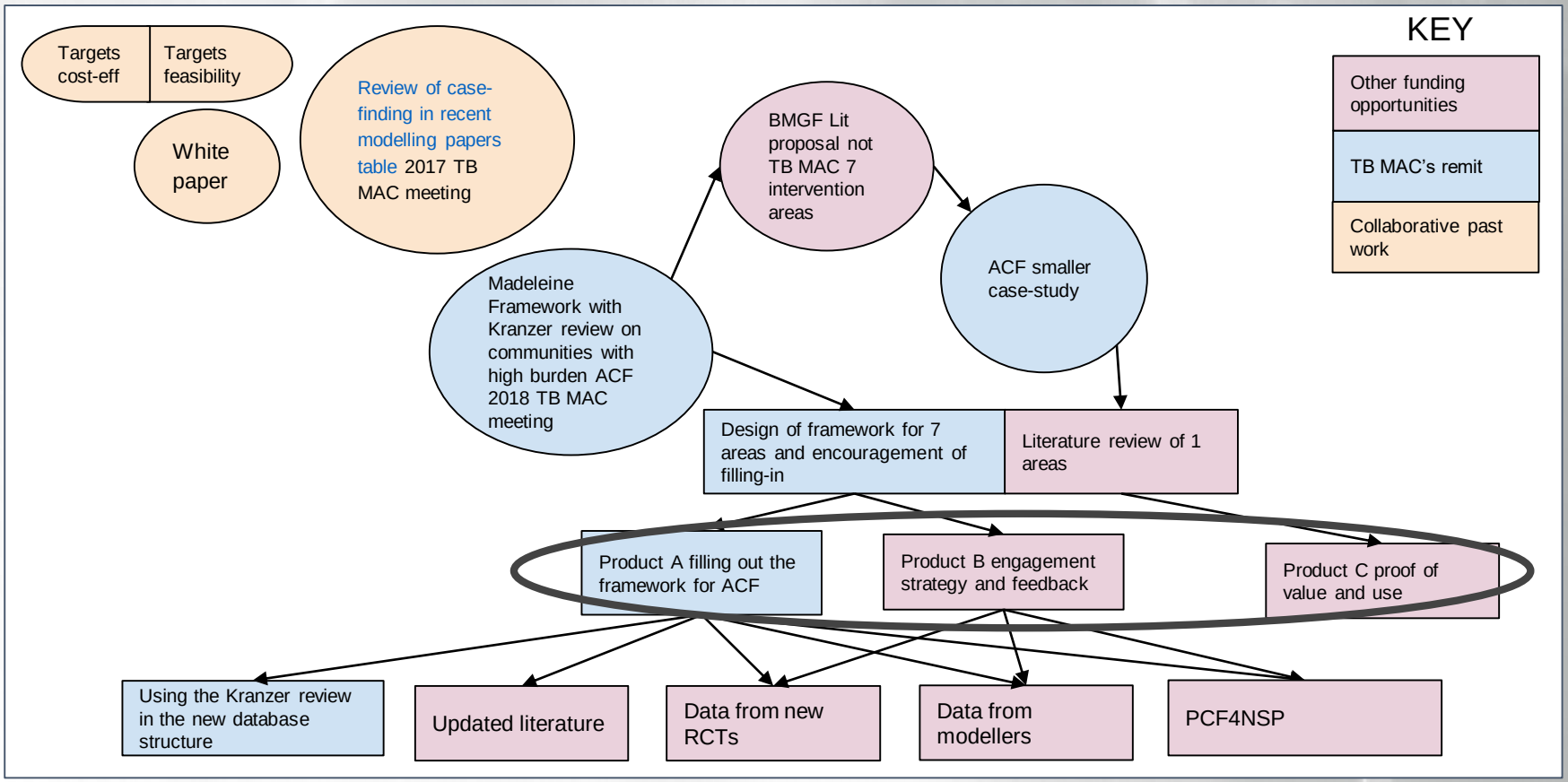
ACT | IMP Project overview



ACT | IMP - Summary of previous work & Evolution of the project

Justification for chosen example area: ACF

- *"Individual and community-level **benefits from active screening** for TB disease remain **uncertain**" (Krazer,2013)*
- *"We're giving these countries additional money **— $125 million—** to help find missing people with TB."* Eluid Wandwalo, Senior disease coordinator TB, the global Fund**,** 2019
- "*The interventions that are **most impactful for incidence and mortality** are... and **case-finding** for early detection of active TB."-*

  "*Pilot studies are underway, that **will help to inform the yield of active case-finding.** Beyond this, in the final document being prepared for NTP, we will present a **dedicated section on uncertainty analysis**, including a **discussion of important evidence gaps**, and our recommendations to NTP, for the additional data that will be helpful in filling these gaps."* - BRR report

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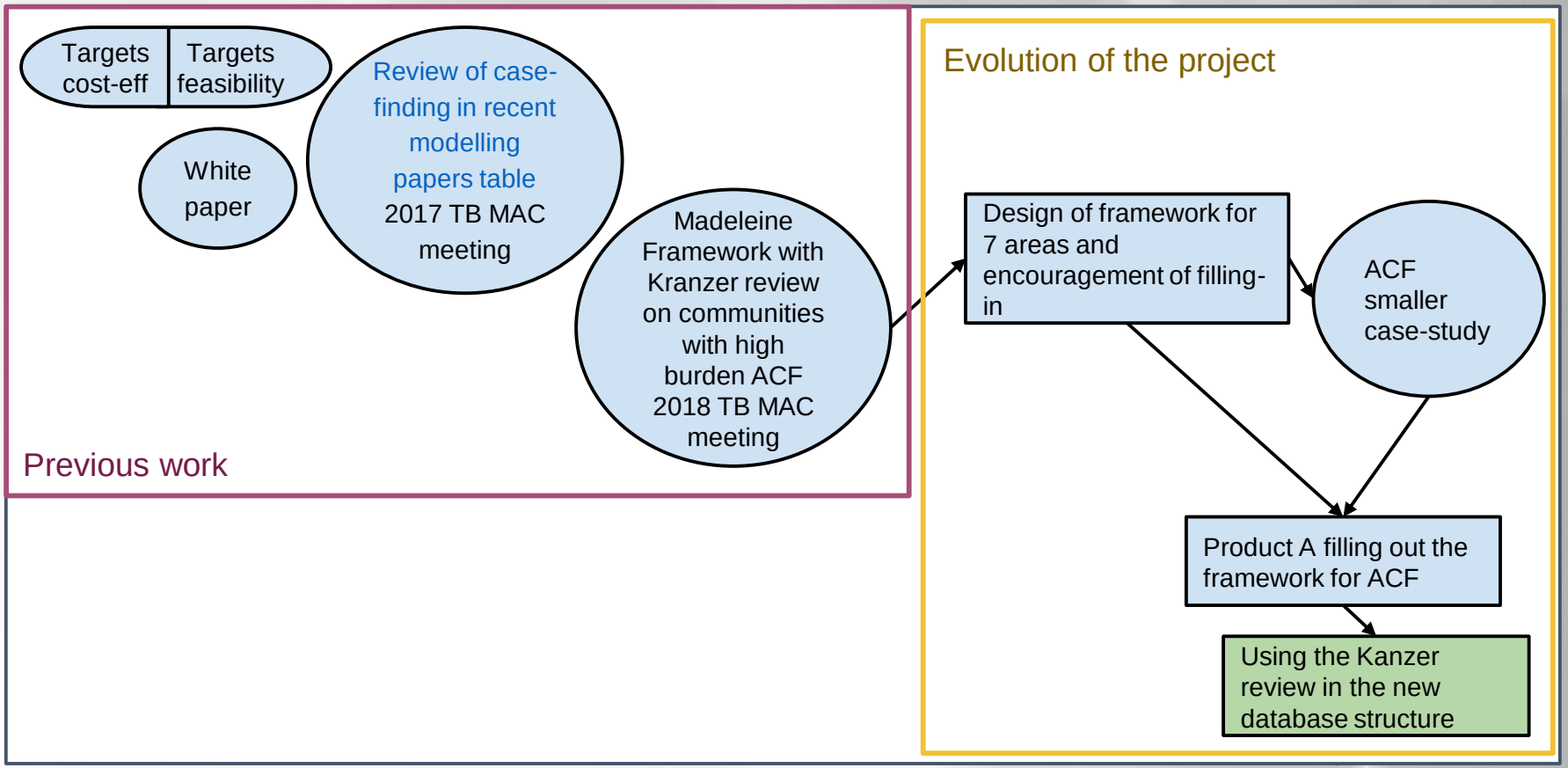
ACT|IMP - Current project direction & issues



ACT|IMP - Current project direction & issues

Database structure - 3 tables

Table 1

Primary author, publication year	Country	Urban /Rural	Intervention type		No. of sites	age	Population measure	Intervention	control
Shargie et al E. B., 2006	Ethiopia	Rural	comm... AC...		8 kebele lowest ...inistr	aged 14> year	pr...	Home- visits survey	Routine programme PCF
Shargie E B, 2006	Ethopia	Ru...			...2		...nnual rate per 100 000	outreach clinics, home	PCF reporting to
Shargie E B, 2006	Ethopia								
Daniel G. Datiko & Bernt Lindtjørn,2009									
Daniel G. Datik... & Bernt					...1 ...eeles	Adults >14			
Moyo ... 201...		Ur... /peri-... rban/			NA	<26 month s			
...al,2...	Brazil	Urban /peri-... rb...		...ster ...andomise	15 neighbour hoods 14	all (provid ed			
Santha ... et al, 2003	India		...dy	comparativ e study /	209 villages	adults age			
Eang et al, 2012	C...		...mmunity ACF	Evaluation - refer to	39 health centres	15</=			

Table 2

Primary author, publication year	total no. eligible for screening: Intervention	no people screened intervention	Comparator	no. of suspect TB patients identified: Intervention	Comparat...	no. of people diagnosed with TB: Interv...	...rator	case-notification rate: Intervention	Comparator	GRADE (WHO)	cost data present
Shargie et al E. B., 2006	5176 households with a	16 697 individuals (59% of the	-	436 (2.6%) individuals from 408		3	...positive	-	-	VERY LOW	-
Shargie E B, 2006	127607 people	-	225284 people	-			...ve	125 per 100 000 person	98 per 100 000 person years	VERY LOW	-
Shargie E B, 2006	74012 adults	-	130665 adults				...ear +ve	207 per 100 000 person	158 per 100 000 person years	-	-
Daniel G. Datiko & Bernt Lindtjørn,2009	178138 people	-	118673 people	72...			88 smear +ve	122.2 per 100 000	69.4 per 100 000		
Daniel G. Datiko & Bernt	-	-	-				-	193.7 per 100 000	118.2 per 100 000		
Moyo S et al, 2012	2392 infants	-	2394 infants			...ear+ve/cultur ...e+ve, 79 CXR	3636(8 smear+ve/cultur e+ve, 28 CXR	2.2 per 100 person-years (1.7 to 2.7)	0.8 per person years (0.6 to 1.1)		
Miller AC et al,2010	11 249 households with 24 177	10 992 households and 23 865	11 319 household... with an		...s	During the intervention (ave 27 days)	During the intervention (ave 27 days)	934/100 000 person-years During the	604/100 000 person-years During the		
Santha T et al, 2003	211 cases	32 663 surveyed	508 cases	211 ...ases	50... ...es	96 smear +ve 0 smear +ve	330 smear +ve 11 smear +ve	-	-		
Eang et al, 2012	405 patients	UQ	602 patients	116 smear +ve	358 smear +ve	116 smear +ve smear grade:	358 smear +ve smear grade:	NA	NA		

Table 3

Primary author, publication year	Health coverage Measures	Staffing and training quanities	Staffing Activities	Diagnostic ...tivity, quantity ...position in ...hm:
Shargie et al E. B., 2006	Y	Y	N	
Shargie E B, 2006	Y	Y		Y
Shargie E B, 2006	Y	Y		Y
Daniel G. Datiko & Bernt Lindtjørn,2009	Y		Y	Y
Daniel G. Datiko & Bernt	Y		Y	Y
Moyo S et al, 2012	Y		Y	Y
Miller AC et al,2010		Y	Y	Y
Santha T et al, 2003	Y	Y	Y	Y
Eang et al, 2012	N	Y	Y	Y

Population and study characteristics

Health outputs and outcomes

Activities

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Database structure - Table 1 :Population and study characteristics

Primary author, publication year	Country	Urban/Rural	Intervention type	Design	No. of Sites	age	Population measure of TB (CNR,incidence, prevalence)	Intervention	control
Shargie E B, 2006	Ethopia	Rural	community ACF	large cluster randomised tri	32 vention ontrol	All includes individuals < 14	average annual rate of 99.2 per 100 000 during 1997–2001	outreach clini visits, pr	porting to alth facilities
Shargie E B, 2006	Ethopia	Rural	community ACF	large rando	32 12 intervention 20 control	Adults >14	average annual rate of 99.2 per 100 000 during 1997–2001	outreach cl home visits, proportion	PCF reporting to health facilities
Daniel G. Datiko & Bernt Lindtjørn,2009	Ethopia	Rural	community ACF	large cluster randomised trials	51 kebeles lowest administrative district 30 int 21 control	All includes 14	In 2006, the estimated number of new smear-positive cases was per 100 000 for Ethiopia.	specific TB training of HEW	No TB specific training of HEWs
Miller AC et al,2010	Brazil	Urban/peri-urban/ informal housing	community ACF	large clu r rando d tri			nce 565 per 100 000	Home-visits	Distribution of an educational pamphlet.
Santha T et al, 2003	India	semi-urban	community ACF	compar / cross- study			ear-positive s was 306/100 ncidenc f new smear- ositive wa 6/ 100 000	Home-visits and X-ray	Routine programme PCF
Eang et al, 2012	Cambodia	mixed	community ACF	Evaluation - refer to text for clarity	ng		-	ACF community session mobile x-ray and microscopy	Routine programme PCF

A subset of Population Characteristics

A subset of the study Characteristics

Information currently collected but not included here: Sex, social status, HIV prevalence, geographical sampling, start and end of the study, sampling and more

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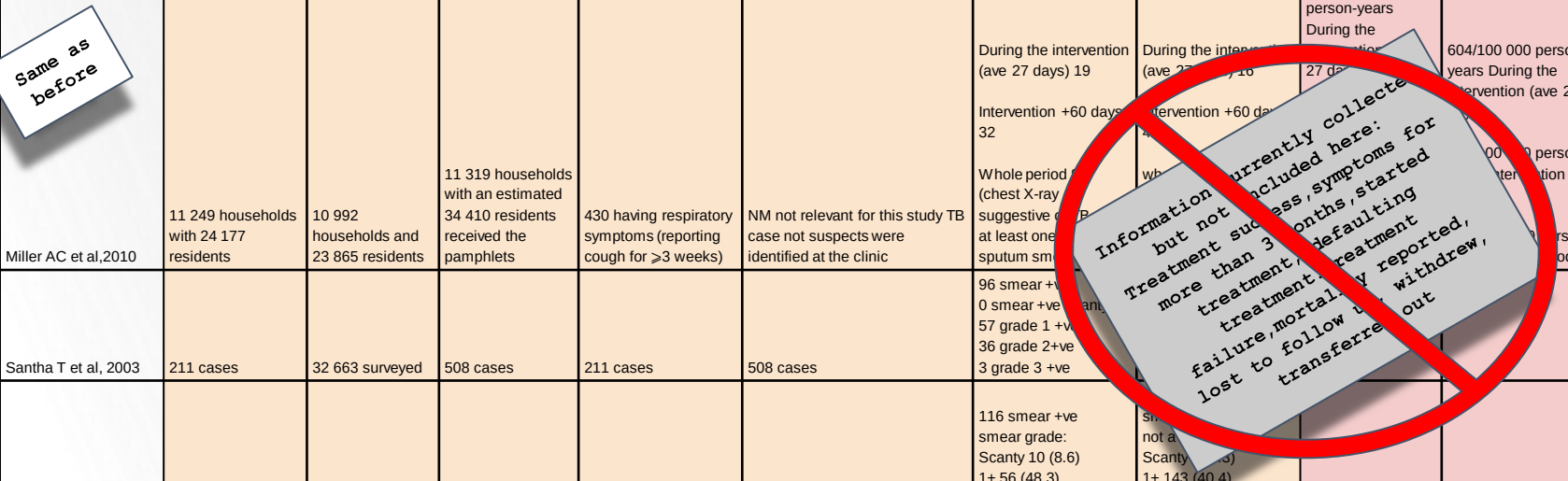
Database structure - Table 2: Health outputs and outcomes

	total no. eligible for screening		no. of suspect TB patients identified			no. of people diagnosed with TB		case-notification rate			
Primary author, publication year	Intervention	no people screened intervention	Comparator	Intervention	Comparator	Intervention	Comparator	Intervention	Comparator	GRADE (WHO)	cost data present
Shargie E B, 2006	127607 people	-	225284 people	-	-	159 smear +ve	221 smear +ve	125 per 100 000 person years (all)	98 per 100 000 person years (all)	VERY LOW	-
Shargie E B, 2006	74012 adults	-	130665 adults	-	-	153 smear +ve	207 smear +ve	207 per 100 000 person years (adults >14yrs)	158 per 100 000 person years (adults >14yrs)	-	-
Daniel G. Datiko & Bernt Lindtjørn,2009	178138 people	-	118673 people	723 pulmonary TB suspects examined	328 pulmonary TB suspects examined	230 Smear +ve	88 smear +ve	122.2 per 100 000	69.4 per 100 000	LOW	-
Miller AC et al,2010	11 249 households with 24 177 residents	10 992 households and 23 865 residents	11 319 households with an estimated 34 410 residents received the pamphlets	430 having respiratory symptoms (reporting cough for ⩾3 weeks)	NM not relevant for this study TB case not suspects were identified at the clinic	During the intervention (ave 27 days) 19 Intervention +60 days 32 Whole period (chest X-ray suggestive at least one sputum sm	During the inter (ave 27 16 ntervention +60 da wh	934/100 000 person-years During the 27 da	604/100 000 person-years During the ervention (ave 27 00 person- ter tion +60 rson- od	LOW	-
Santha T et al, 2003	211 cases	32 663 surveyed	508 cases	211 cases	508 cases	96 smear + 0 smear +ve 57 grade 1 +v 36 grade 2+ve 3 grade 3 +ve				-	-
Eang et al, 2012	405 patients	UQ	602 patients	116 smear +ve	358 smear +ve	116 smear +ve smear grade: Scanty 10 (8.6) 1+ 56 (48.3) 2+ 30 (25.9) 3+ 20 (17.2)	sm not a Scanty 1+ 143 (40.4) 2+ 137 (38.7) 3+ 66 (18.6)	NA	NA	-	There are cost data for a subset of this data



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Database structure - Table 3 Activities

Same as before

	Have and measures been collected as part of this research/ source			
Primary author, publication year	**Health coverage Measures**	**Staffing and training quantities**	**Staffing Activities**	**Diagnostic activity, quantity and position in algorithm:**
Shargie E B, 2006	Y	Y	Y	Y
Shargie E B, 2006	Y	Y	Y	Y
Daniel G. Datiko & Bernt Lindtjørn,2009	Y	Y	Y	Y
Miller AC et al,2010	Y	Y	Y	Y
Santha T et al, 2003	Y	Y	Y	Y
Eang et al, 2012	N	Y	Y	Y

Binary information

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Data excluded and simplified in Table 3 Activities

Health Coverage:	**Staffing & training:**	**Staffing Activities:**	**Diagnostic activity, quantity and position in algorithm:**
• Hospitals servicing population • TB specialist centers • Health centers servicing all populations (defined by study area) • Health stations servicing all populations (defined by study area) • Health posts servicing all populations (defined by study area) • Health facilities able to do microscopy • Health coverage measure	• Health officers • nurses • doctors • laboratory technicians • specialist staff • health workers • community members • additional non-medical staff • health staff training (in days) • health staff training details • community members training (in days) • community members training details	• health staff activity • activity quantity by health staff • activity by health staff detail • community member activity • activity quantity by community members • Activity by community members details	• Verbal Screening activity • clinical assessi • Sputum collectio • diagnostic test (on sputum) • Additional diagnostic tests (on Sputum) • diagnostic test (not sputum) • Additional diagnostic tests (not Sputum) • Additional tests

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Health Coverage measures:

Moyo S et al, 2012

Hospitals servicing population	**TB specialist centers**
well-serviced by clinics and hospitals	1 TB specialist regional hospital

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Health Coverage measures:

Shargie et al E. B., 2006

Hospitals servicing population	TB specialist centers	**Health stations servicing all populations (defined by study area)** **3**	**Health centers servicing all populations (defined by study area)** **4**	**Health facilities able to do microscopy** Sputum samples in iceboxes were transported to the regional health research laboratory in Hossana each day.	**Health coverage measure** 55% (accessibility of a health facility within 2 h walking distance)

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Health Coverage measures:

Daniel G. Datiko & Bernt Lindtjørn,2009

Hospitals servicing population	TB specialist centers	**Health stations servicing all populations (defined by study area)**	**Health centers servicing all populations (defined by study area)**	**Health posts servicing all populations (defined by study area)**	**Health facilities able to do microscopy**	Health coverage measure
		3 (1 official and 2 upgrading Health stations)	**2**	**21**	**3**	

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Proposed data collection detail

1. High level population characteristics and health outcome and impact measures
2. Only report Y/N if any activities of that type have been reported in the source document

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Discussion

Rein Houben

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Activities to Impact

Modellers' Perspective

TIME
TB Impact Model & Estimates

LONDON SCHOOL of HYGIENE &TROPICAL MEDICINE

Impression

- Very useful resource
  - Papers in 1 place, link to costing data
  - Easy to access and navigate
- Modelling team will look for/read original paper
  - no need to extract all detailed data, navigation/accessibility more important
- Nothing will ever be 100% right study/data, give data-point or range that may be appropriate.

TIME
TB Impact Model & Estimates

LONDON SCHOOL of HYGIENE &TROPICAL MEDICINE

Needed/suggestion

- Diagnostic algorithm and results
  - Sensitivity and Specificity
  - Number screened, notifications gained

Clinical Infectious Diseases

VIEWPOINTS

What if They Don't Have Tuberculosis? The Consequences and Trade-offs Involved in False-positive Diagnoses of Tuberculosis

Rein M. G. J. Houben,[1,2] Marek Lalli,[1,2] Katharina Kranzer,[2,3] Nick A. Menzies,[4] Samuel G. Schumacher,[5] and David W. Dowdy[6]

Table 1. False-positive Tuberculosis Diagnoses in Hypothetical Screening Programs

Prevalence in Screening Population	Algorithm 1: Any Symptom → Smear → Empirical Diagnosis		Algorithm 2: Any Symptom or Radiograph → GeneXpert Assay		Impact of New Algorithm in Population = 100000		
	PPV	Ratio TP:FP	PPV	Ratio TP:FP	Change in No. of TB Diagnoses	From FN to TP	From FP to TN
10%	73%	1:0.37	95%	1:0.05	+2261	3767	1506
5%	61%	1:0.64	90%	1:0.11	+1369	2271	902
1%	29%	1:2.50	64%	1:0.56	+157	526	369
0.5%	17%	1:4.78	67%	1:1.13	–30	268	298
0.15%	6%	1:15.29	21%	1:3.78	–166	82	248

Needed/suggestion - ACF

- 'True' Epidemiological impact
  - Reduction (if any) in transmission
  - Reduction (if any) in incidence
- Include classic Xray based studies
- Have platform for new studies as they come through.

- *Kranzer et al. (IJTLD 2013)*

*"In conclusion, the **evidence** of individual and **community-level benefits of systematic screening** is **remarkably limited**, given the high public health significance, long history and scale on which this approach has been implemented in the past."*

TIME
TB Impact Model & Estimates

LONDON SCHOOL of HYGIENE &TROPICAL MEDICINE

Needed/suggestion – other areas

- Expand to other areas would be welcome
- Build agreed database with key example publications.

- Final aim: range for appropriate values?
  - what can be achieved/expected (epidemiologically) with a given activity
  - Challenges abound – what contextual factors matter?

- But that is future, first complete this task

TIME
TB Impact Model & Estimates

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Thank you

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